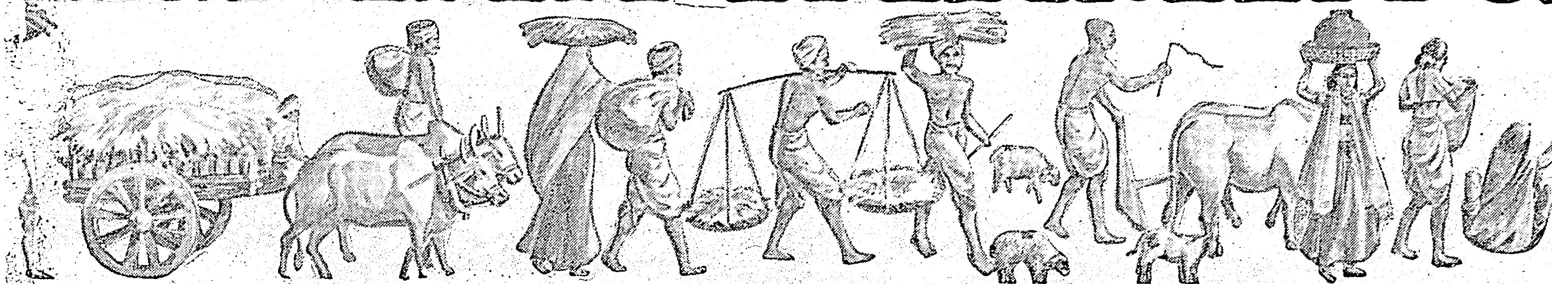
INDIAN FARMING



PRICE 12 ANNAS JANUARY 1954 VOLUME III. NO. 10

INDIAN FARMING

Vol. III New Series No. 10 Jan. 1954

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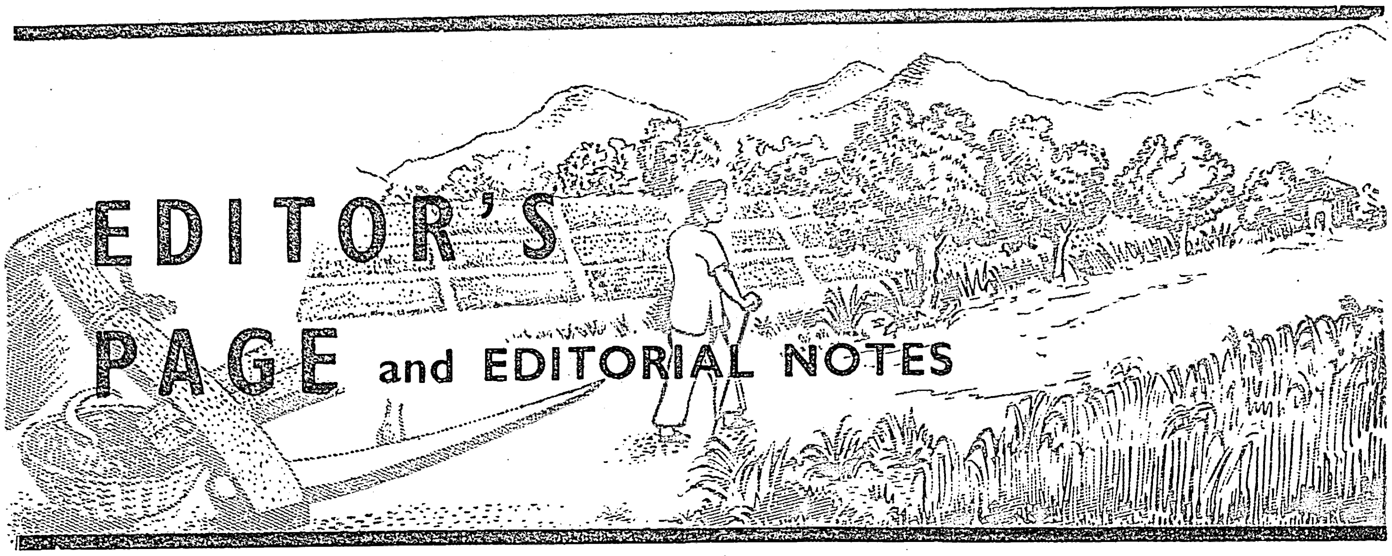
Printed and published by P. H. Raman at the Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7.

(Agents for Indian Council of Agricultural Research, New Delhi.)



Sometime back, to be precise in November 1952, an Agricultural Information Conference was called at Lucknow by the Indian Council of Agricultural Research. The Conference discussed the general agricultural information set-up in this country and stressed the need for establishing a net-work of information centres right from the Central headquarters to the village level. The Conference aroused great expectations among interested people and a plan was visualized to ensure a steady flow of useful technical information from the laboratory to the field. It was contemplated at that time that the information to be thus passed on should relate not only to agricultural and animal husbandry problems or subjects but also to other aspects of rural life. It was realised that while laboratories would be increasingly linked with the fields, the second line of communication connecting the fields with the laboratories was sadly missing. It was, therefore, felt imperative that this vital link should also be established.

It must be admitted that we are at present living in a world which is daily seeing change of values and increasing importance being attached to hitherto neglected aspects of life and work. In face of this, preservation and continuance of useful established practices which cannot be challenged by improvement in scientific knowledge or technique seem to be essential. But even such accepted ways of agricultural production, and much of the newer innovations which the farmer adopts will certainly throw out problems which can possibly be solved with the help of experts. The farmer in that case should not only be entitled to have useful technical information from laboratories passed on to him but also to send up any problem that confronts him in his day to day life to experts for research and solution. The development of this line, however, will to a great extent depend on the initiative of the farmer himself. For, he alone knows best the problems that confront him in the field. But even then the technician should be receptive, his attitude encouraging, and his approach appealing to the imagination of the farmer. Such a stand will tend to create confidence in the farmer and educate him to look upon the experts not as distant aliens but as fellow human beings whose hands are always stretched out for advice, help and service.

If this is accepted as the plan of how things are to be shaped in the sphere of agricultural information, it requires to be seen how far this conception has actually been adopted. If this has been adopted at all, it remains to be seen how far the plan of agricultural information set-up has really been executed. It must be admitted at the outset that this being almost a new venture in this country, the progress must necessarily be slow. This has to be so, especially because the background against which this information service is to be conceived is much too crowded with established practices probably, in many cases, without any relation to scientific research and progress.

A meeting of the Central Agricultural Information Committee was held for the first time in Delhi in December 1953. In this Conference many items of work in the sphere of information service were discussed. The Conference once again emphasized that the progress will not be ensured only by stressing the work at the Centre or at the State headquarters. A uniform plan of work should be developed which should reach right down to the village level. This is a lead in the right direction in view of the fact that it is in the villages that the unit of agricultural operations is situated and any plan of work, which, in its zeal of going ahead, leaves the rural areas behind in

its organizational set-up and bestows undue attention on certain selected and specific focal points, is bound to be misleading and fail miserably.

As decided by the Agricultural Information Conference at Lucknow, the Indian Council of Agricultural Research was made responsible for implementing the recommendations adopted therein. As a test case the Council planned a programme of informational work publicising the Japanese method of paddy cultivation. The programme was planned out from the Centre. But the entire agricultural set-up of the country was taken into consideration before it was finally adopted and taken down to the State headquarters, districts, *tehsils* and ultimately to the villages. A large amount of literature was specially prepared on the subject giving practical instructions on the technique of the Japanese method of paddy cultivation. These were sent out to various parts of the country where they were translated into regional languages so that even farmers with only limited ability to read could follow the hints given therein. It may be worth while to mention in this connection that the language used in the preparation of this literature was of the simplest kind and gave the instructions in as direct a manner as possible so that the reader might not misunderstand the meaning and significance of the instructions. Not only the written literature but also posters, film strips, flannelgraphs and other visual aids were taken recourse to for this programme of countrywide publicity. The results achieved were indeed very encouraging and from the large number of acres put under the Japanese method of paddy production, it could be safely stated that the programme was a very successful one. The conclusion, therefore, appears irresistible that such other programmes, if planned on a countrywide basis, are likely to yield equally successful results.

As an integral part of the agricultural information set-up, Information Committees have already been established in a number of A, B and C States in addition to the one at the Centre. Information programmes require rapid production of necessary literature; as such it is imperative that provision should be made at the Centre as well as at the State headquarters for the production of this essential prerequisite. In view of this, it has been decided to help many of the States with suitable facilities for the production of requisite material which could be useful to the farmers in their day to day operations during the cropping seasons.

The information work as envisaged at the Lucknow Conference will inevitably be slow to take shape. This is a vast country with different agro-climatological regions. Thus a great variety of problems is likely to crop up. The nature of information to be passed on will vary not only with particular problems confronted with or with climatological regions but also with the receptive capacity of groups of farmers or an individual in a selected area. The experience gained in the working of a programme will go a long way to modify it if necessary, in order to adapt or

(*Contd. on page 30*)

Shri Jayaram Krishnarao Gaikwad

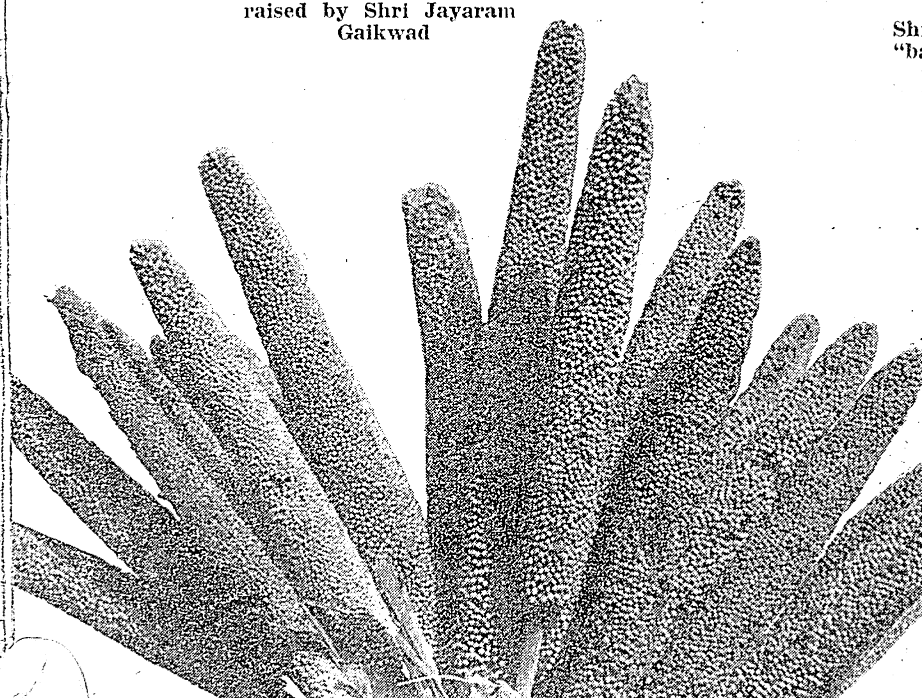
MAN OF THE MONTH:

Nasik Farmer Sets up New Record in BAJRA yield

By

A. R. VYAS

Magnificent cobs of "bajra" crop raised by Shri Jayaram Gaikwad



NASIK town is a centre of pilgrimage; the district, according to its agricultural officer, stands first in the Bombay State for its largest acreage under *bajra,* the largest area under wheat, the largest under onions and the largest under grapes. To these distinctions must be added still another, of producing prize-winning farmers.

Shri Gaikwad raised 4,578 lb. of "bajra" on an acre of land during the 1952-53 "kharif" season

Shri Gaikwad has three sons; two are graduates, one in agriculture and the other in mathematics. The youngest, Ramrao, a student of the Intermediate class, helps his father to manage the farm

For, Shri Jayaram Krishnarao Gaikwad, the winner of the first prize in the *kharif* crop competition for *bajra* held at the State level in Bombay who produced 4,578 lb. on an acre, belongs to village Ojhar in the Nasik district. I had the good fortune of meeting this enterprising farmer last September, for his fame had travelled beyond the confines of his small village, which lies about 12 miles from Nasik town on the metalled Bombay-Agra Road.

Accompanied by Shri Phadtare, the Agricultural Officer of the district, I met Shri Jayaram Gaikwad at his spacious village house, which stood out from the rest of its surroundings by its cleanliness and sense of permanence. That was also the impression I got of the man, as we talked quietly over a cup of tea. His was an orderly mind, which through years of experience of agriculture, had come to the conclusion that there was stability in the land.

Fifty-nine-year old Jayaram seemed to me taciturn by nature. No waste of words in his speech; his answers often in monosyllables were brief and to the point. He spoke to me in English but when he wanted to drive home a point, he fell back on his native Marathi. His family, he told me, were professional agriculturists, and he had about 80 acres, half of which were under *bajra* last *kharif*. He also grew onions, sugarcane, vegetables and wheat.

METHODS USED

From the large area which Shri Gaikwad put under *bajra*, I gathered that he had concentrated much of his efforts on this crop. I asked him the secret of his outstanding success.

"The use of improved seed, proper tillage, plenty of manure, and adequate and timely irrigation", he replied.

This was not enough for me. I wanted more information, fuller details. Bit by bit, through the assistance of the Agricultural Officer, I was able to piece the following story.

The soil on which the *bajra* crop was raised was of the medium black type. Onions had been raised on it earlier for which the land had been heavily manured. After the onion harvest, the land had been harrowed three times. *Bajra* seed of the Akola variety was sown at the rate of 14 chhataks an acre, with a seed-drill in mid-July, the space between two furrows being about nine inches.

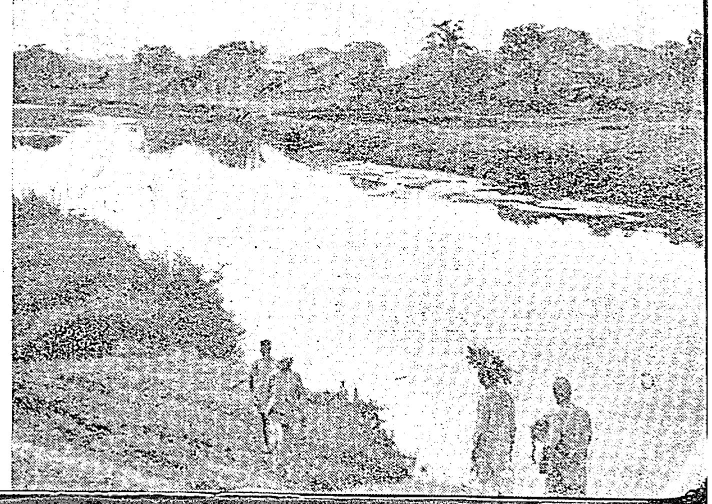
Before the land was sown, the following doses of manure were applied in it: four maunds of manure mixture, 2 cwt. of ammonium sulphate and 5 md. 10 sr. of cake-meal. The germination of the crop was excellent.

From the time of sowing till almost harvest, at intervals of two weeks, weeds were removed. The crop was intercultured three times, the first time three weeks after its sowing, then at an interval of a week each time.

To make up for the deficiency in rainfall, Shri Jayaram used well-irrigation. When the crop was four weeks old, it was manured heavily again. The manures used were: four maunds each of ammonium sulphate and groundnut cake, eight pounds of borax, six pounds of manganese and four pounds of copper sulphate. I was told by the agricultural experts that the use of the last three items had greatly helped in the production of a bumper crop. When it was harvested in the first week of October last year, it stood over eight feet high. The standing crop this year too had already reached a magnificent height when I saw it. The determination of Shri Gaikwad to compete for the all-India first prize in *bajra* during the 1953-54 *kharif*, I realised, was no wishful thinking. He has already lowered the last all-India prize win-

A view of Jayaram's "bajra" crop which stands nearly eight feet high

A view of the Bana Ganga river which skirts Jayaram's estate and provides irrigation



ner's record in *bajra* by over 2,250 lb. an acre. This Nasik farmer needs watching, for 'Rao Saheb' as he is affectionately called, is known all over the district as the 'most progressive' cultivator.

PROFIT AND LOSS

I have always been interested in the economics of such high yields. I pursued the same line of enquiry with my host of the evening, as we were leaving his fields. The total cost of cultivation of the one-acre plot entered for the competition, he told me, came to about Rs. 400.

"And the income?" I asked.

"The grain was sold at an average rate of Rs. 20 per maund and 300 bundles of fodder fetched about Rs. 150", he replied.

I made a quick calculation, which showed that Shri Jayaram had made a net profit of about Rs. 870 per acre.

I was curious to know some more details of the cost of cultivation. Sensing what I was after, Shri Phadtare of the State Agricultural Department slipped a sheet of paper into my hand. It revealed that the cost of seed and its sowing came to about Rs. 5-12 for the acre, while the cost of manures and their application was Rs. 253! That I suppose was Shri Gaikwad's 'open sesame' to fame. This was confirmed by this farmer's reply to my parting question: "What assistance should the Government give to help cultivators raise their production yields?"

His reply was: "More *bandharas*, more wells and tanks, and a sufficient supply of manures in time." He talked from experience and he should know.

OMISSION

The name of the author of the article entitled "Sheep Farming in Rajasthan" published in the December 1953 issue of Indian Farming has been inadvertently left out. The author of this article is Shri N. L. Narayan, Sheep and Wool Improvement Department, Rajasthan

ANNOUNCEMENT

The Indian Dairy Science Association has organized an Essay Contest open to all *bona fide* students of dairy, agricultural, Veterinary and other educational institutions and research institutes. The subject of the Essay is "Application of Refrigeration in Improving the Dairy Trade in India". Further particulars about the Contest can be obtained from the Hon. Secretaries, Indian Dairy Science Association, Hosur Road, Bangalore–1.

EFFECT OF FERTILIZER TREATMENTS ON OATS AND BERSEEM IN THE PUNJAB

By

H. C. MALIK,

Economic Botanist (Fodder), Sirsa

OATS make an excellent forage crop for those regions where the spring is cool and moist, and the soil is deep and well-supplied with moisture, but like wheat, they can be adapted to varying soil and climatic conditions and fit admirably well into the regular rotation systems. They are, however, raised primarily at places where moisture is insufficient for berseem production.

A number of oat varieties, viz. early, medium and late-maturing, have been developed at the Fodder Research Station, Sirsa, Punjab, all of which supply highly nutritious and sustaining forage. Early varieties provide green forage in February, mediums in March and the late ones upto the end of April. Late varieties may even remain green for a much longer period under favourable conditions. As there were wide differences in their yields studies regarding their response to fertilizer treatments with a view to enhancing their forage production were considered necessary.

Five varieties approved by the Department of Agriculture, Punjab, viz. Brunker 10 and Weston 11 from among the early-maturing, Fulgham 15 from the medium-maturing and FOSI/29 and Algerian 19 from among the late-maturing varieties were compared in regular complex experiments for a period of three years from 1950-51 to 1952-53 with a view to studying their response to different fertilizer treatments, viz. farmyard manure 15 tons per acre, 40 lb. nitrogen in ammonium sulphate and their combination on 50 : 50 basis.

Farmyard manure was applied about one month ahead of sowing in order to enable it to become available to the plants and ammonium sulphate was broadcast with the first irrigation given to the crop. The crops were sown in the fourth week of November. They exhibited quite good growth and were harvested at the full bloom stage.

It was observed that the highest forage yields were obtained from the crop to which mixture of farmyard manure and ammonium sulphate was applied, the next fertilizers in order of efficiency being ammonium sulphate and farmyard manure.

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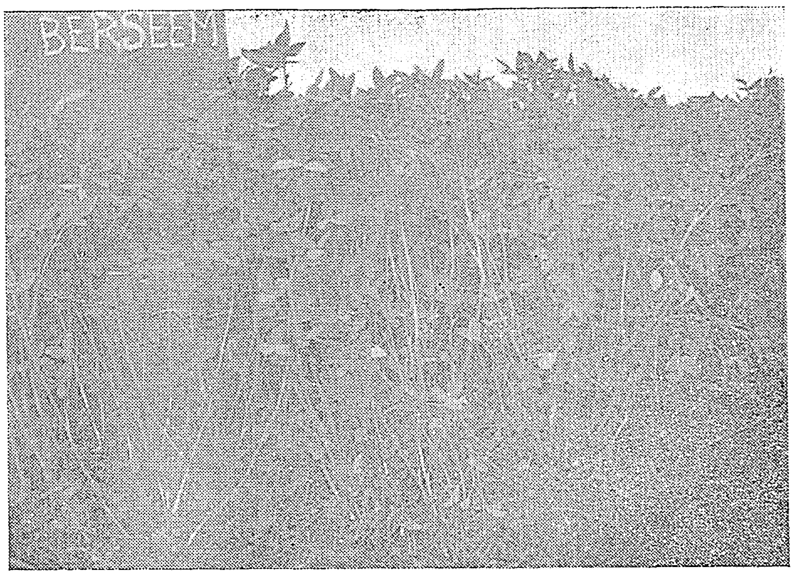


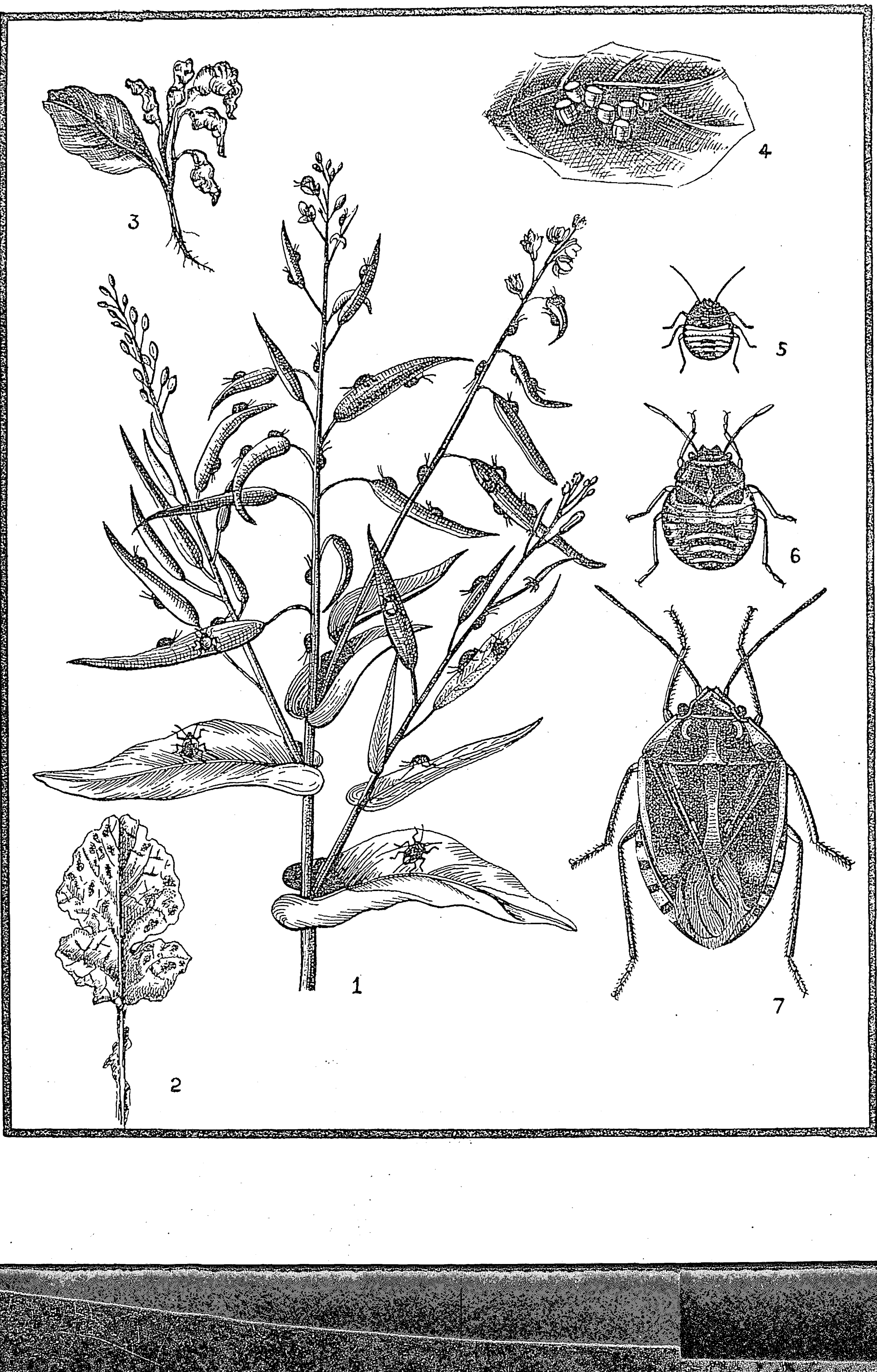
Berseem

SEASONAL PESTS OF CROPS:

THE PAINTED BUG, *BAG*

BAGRADA CRUCIFERARUM KIRK

1. An infested mustard plant
2. A radish leaf that has been partially damaged
3. A mustard seedling that has been seriously damaged, about to die
4. An egg cluster
5. A young nymph
6. A half-grown nymph
7. The adult bug



RADA CRUCIFERARUM KIRK

By E. S. NARAYANAN,

Indian Agricultural Research Institute,
New Delhi

THOUGH the orders to which the beetles and the moths belong contain many serious pests of world-wide importance, they have not gained the same notoriety as the smaller but mighty group of insects to which more than ten thousand species of bugs belong. The simple reason is that beetles and moths are not so loathsome as the bugs, nor do they emit that horrible stench that is characteristic of many members of the bug family. Some species of bugs drink human blood after the fashion of vampires and leeches and are sometimes carriers of agonising diseases fatal to man. These characteristics have made the bugs repulsive and loathsome. The family contains a number of serious pests of agricultural crops and orchard trees. One of the characteristics of these pests is their terrific rate of reproduction. It is this high prolificacy that makes them such devastating pests. Huxley has shown that if all the ten broods of one aphis developed into adults, without suffering any mortality, the progeny of the last brood would weigh more than five hundred million well built men. In the following pages the biology and control of *Bagrada cruciferarum,* popularly known as the painted bug, a pest of cruciferous crops, is described in some detail.

Bagrada cruciferarum is a small bug of pretty black and orange colour that drains the life from the cruciferous plants by sucking their sap in its greedy stomach. Though they are found in the field almost every year, in certain years they occur in an epidemic form and the damage caused by them is oftentimes very serious. The young plants that are attacked wilt and die and so resowing of the crop becomes a necessity. Later in the season when mustard, radish, cauliflower, etc. have grown and developed into larger plants, thousands of these bugs cluster over the leaves and pods draining away their life-juice. The seed crops are particularly heavily infested and as a result of this attack both their quality and quantity are severely affected. The pest also thrives well on *Heliotropium* sp. a weed that grows wildly in the field amidst the cruciferous plants. The pest has also been reported attacking coffee, paddy, indigo and sugarcane in certain areas in the Indian Union, but there can be little doubt that these are only exceptional cases. When their population in any kitchen garden is high, they have also been observed to get on to some neighbouring ornamental plants showing thereby the polyphagous habit of the bug. The pest has been recorded on cruciferous plants throughout the Indian Union. Outside India it has been reported from Ceylon, Burma, Kenya, Bagdad and East Africa. Usually the damage is more serious on older plants.

IT MULTIPLIES VERY RAPIDLY

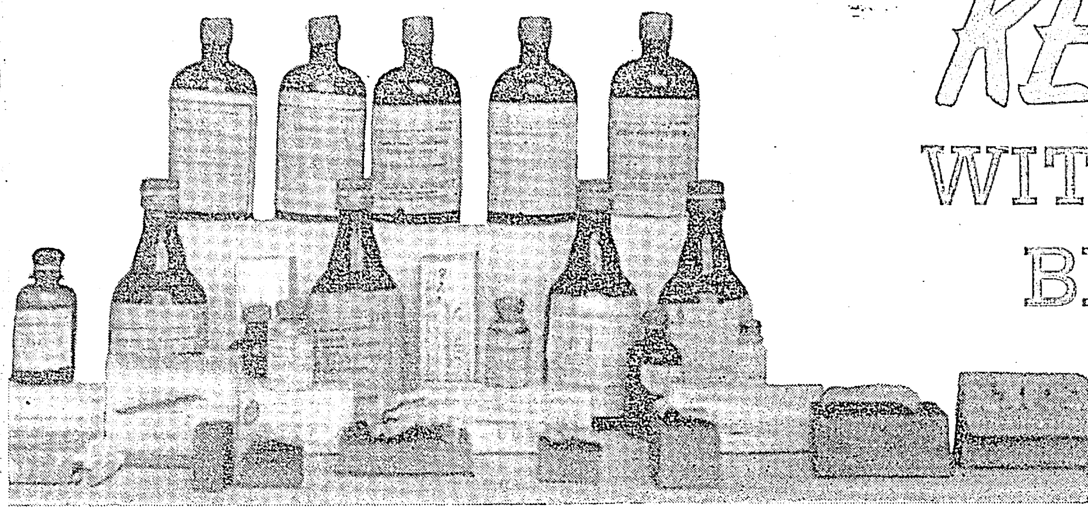
The adults begin to mate within two to six days after emergence. It is a very common sight in the field to see several pairs mating. This is true not only of this bug but many of the bugs that are pests of agricultural crops. The preoviposition period varies from one to two weeks. Eggs are laid daily more than once till the female is about to die. So we see that the prolificacy of the pest is very great and it is this rapid rate of reproduction and the increase of the progeny in geometrical progression that makes this pest in certain years so devastating. Eggs are usually laid in loose soil at a depth of about ¼in. near ant hills, termite nests or even rat burrows. Occasionally, eggs are also laid on leaves, stem and the inflorescence of plants in which case they are firmly glued on to the plant surface by means of a sticky secretion. The bug lays eggs singly or in clusters numbering a dozen or more. The number is particularly high when the eggs are laid in the soil and as many as 75 eggs have been counted at one laying. A female has been observed to lay on an average 15 to 20 eggs a day and a maximum of 230 eggs in her life-time.

The eggs are pale yellow in colour when freshly laid and turn pinkish just before hatching. Each egg is oval in shape and measures about 1 mm. long and 0.5 mm. broad. The eggs hatch in about two to five days. The tiny bugs grow rapidly and after passing through five successive stages of growth develop into winged adults. The freshly hatched nymphs are bright orange in colour with bright red eyes and measure about 1.2 mm. long and 0.9 mm. broad. The fifth stage nymph is about 4.5 mm. long and 3 to 3.2 mm. broad. The adult has a black body with orange or brownish spots. The total nymphal period occupies from three to three and a half weeks. The life-cycle is completed in about 22 days in the case of males and 25 days in the case of females. The males live a little longer than the females, the average longevity of the former being 18 days and that of the latter 16 days. The adults first appear in the field about the middle of October and as they lay eggs at short intervals a very large number of these bugs in all stages is soon found infesting the various cruciferous plants. The activity of the pest gradually slows down by March when most of the cruciferous plants are harvested, and for some time a large number of these are found congregating under heaps of harvested mustard and radish or other dry vegetation or even compost heaps that may be lying nearby. A few adults survive during the heat of the summer taking shelter in crevices in bunds near irrigation channels.

(*Contd. on page 27*)

KEEPING WITH THE USE BIOLOGICAL

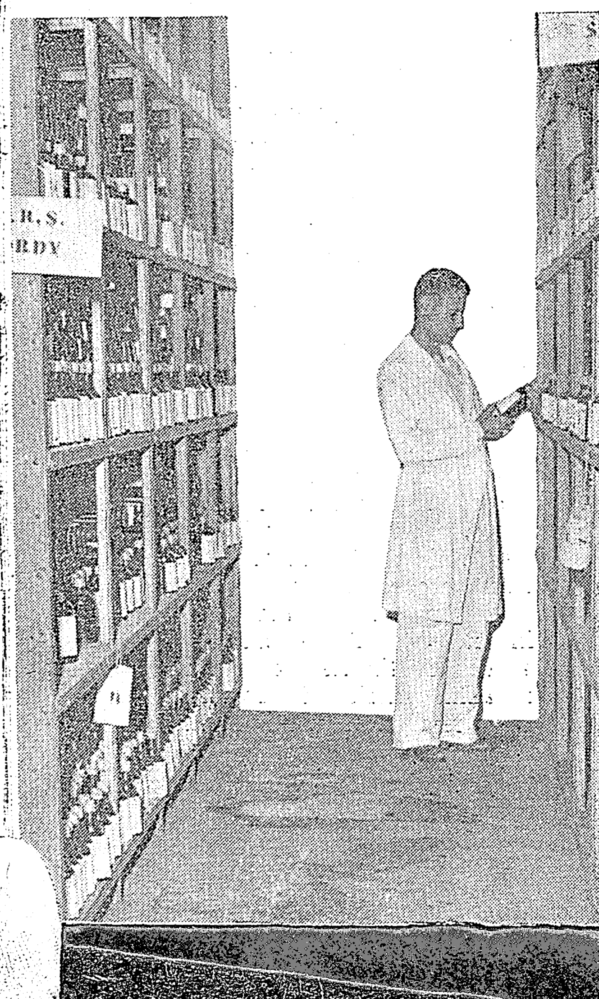
By
BALWANT SINGH,
Head of the Division of
Biological Products,
I.V.R.I., Izatnagar



Various biological products in their respective containers and packings

THE existing agricultural set-up in India in relation to livestock represents a radical change over the old system. Livestock then meant a few animals belonging to the individual cultivator who kept them for plough and milk. But now in modern times when population has increased, distances have been cut short by speedy transport, and increased movement of livestock and human population has been taking place, the problem of keeping livestock healthy has become complex. There is keen competition between man and animal for food and in the long run animals suffer more. Undernourishment and unsuitable weather conditions cause many diseases resulting in a heavy loss of animal life. At home this loss causes great monetary set-back and abroad even our finest animals are not preferred for fear that they will spread cattle pests. As such, the problem of keeping animals healthy with the use of veterinary biological products has assumed importance in the international field. There is an all-round effort to perfect and manufacture veterinary biological products to control animal diseases so that maximum production in respect of work, wool, hides and skins, milk and meat on which human prosperity depends so much, may be attained.

Checking the labels of biological products stored in the cold room



WHAT ANIMAL DISEASES MEAN TO MAN

Man is concerned with this problem from two angles; first his own safety and, second, maximum production. Animal diseases affect him partly because of much financial loss, but mainly because they are communicable. So far it is known that there are at least 55 different animal diseases caused by microbes communicable to human beings. A mad dog is a potential danger to human life and so is the pustule or anthrax. Equine encephalomyelitis, sometime back, caused a heavy human mortality in U.S.A. In Western countries, tuberculosis-infected milk causes tuberculosis among a large number of children. In areas where abortion in animals is caused by germs, the danger for human beings contracting the infection is great.

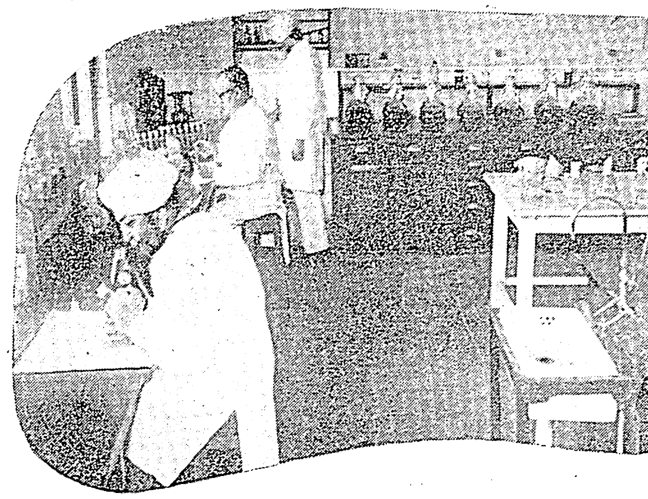
Apart from this, the monetary loss due to these diseases is very great. In India, the annual mortality in cattle due to rinderpest alone is about $2\frac{1}{2}$ lakhs. This amounts to a loss of nearly $2\frac{1}{2}$ crores of rupees. Great loss is also caused by foot-and-mouth disease. In milch animals there is nearly fifty per cent reduction in the milk yield apart from chronic debility and unthriftiness caused by this disease. Estimates show that about one to five per cent of female animals harbour germs of abortion and one out of seventeen animals becomes unfit for future procreation.

NEED FOR CONTROL OF DISEASES

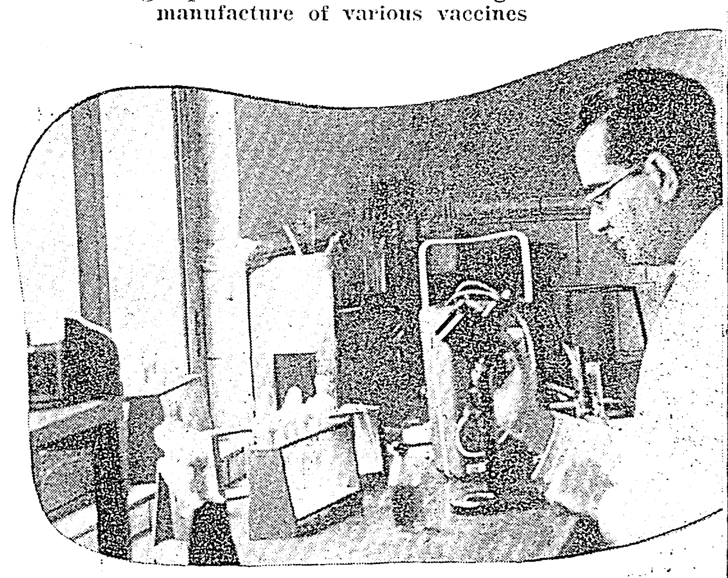
There is an urgent necessity for thorough control of animal diseases in India, with special reference to an international programme of animal disease control. This is necessary because of migration of livestock from various parts of the world which

ANIMALS HEALTHY

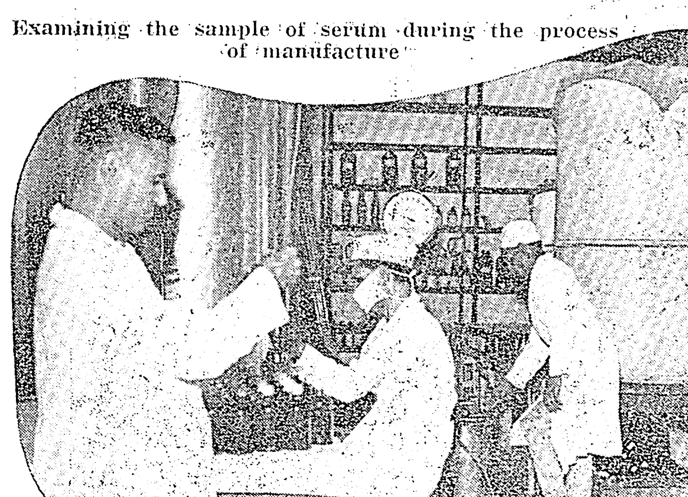
OF VETERINARY PRODUCTS



Conducting microscopic examination (foreground)



Checking "p" H of media before using it for the manufacture of various vaccines



Examining the sample of serum during the process of manufacture

may bring into a particular country a disease not already prevalent.

The work of animal disease control at first was restricted to treatment of individual animals. As such there appear in old records, descriptions of many medicines which were used for treatment. But later on it became an established fact that animals must be treated as herds and not individually. In other words, animals must be protected against diseases before the diseases have chances to kill them. For this reason, biological products have become popular.

BIOLOGICAL PRODUCTS AND THEIR MANUFACTURE

Biological products in their widest sense represent a group of agents which when introduced in the body afford protection against the germs to oppose which these agents have been manufactured. These also include the extract of some germs which when injected into the body of diseased animals cause reaction by which the disease can be diagnosed. These are known as diagnostic agents and are used to detect tuberculosis, Johnes disease, glanders, etc.

Vaccines and sera are the most important among biological products.

Vaccines represent killed, weakened or living microbes or germs which produce in the animal system antibodies which, in turn, give protection against the disease.

Serum against a particular disease gives a short-term protection.

Vaccines and sera against practically all important diseases of animals are manufactured in India, the largest unit for their manufacture being located at the Indian Veterinary Research Institute, Izatnagar. There are smaller units in the various States also. The annual output of biological products at the Central Unit is more than fifty lakh doses.

The work of manufacture of biological products is a highly complex one and requires utmost care. Elaborate equipment for sterilization, processing of sera and vaccines, freeze-drying of vaccines into absolutely dry form and cold-storage facilities constitute a few of the many necessities of a modern manufacturing unit.

(Contd. on page 29)

Nilkalami

a menace to Sugarcane Crop

By
C. THAKAR and H. N. SINGH
Central Sugarcane Research Station,
Pusa (Bihar)

The weed covering the top of the sugarcane plant which has bent down

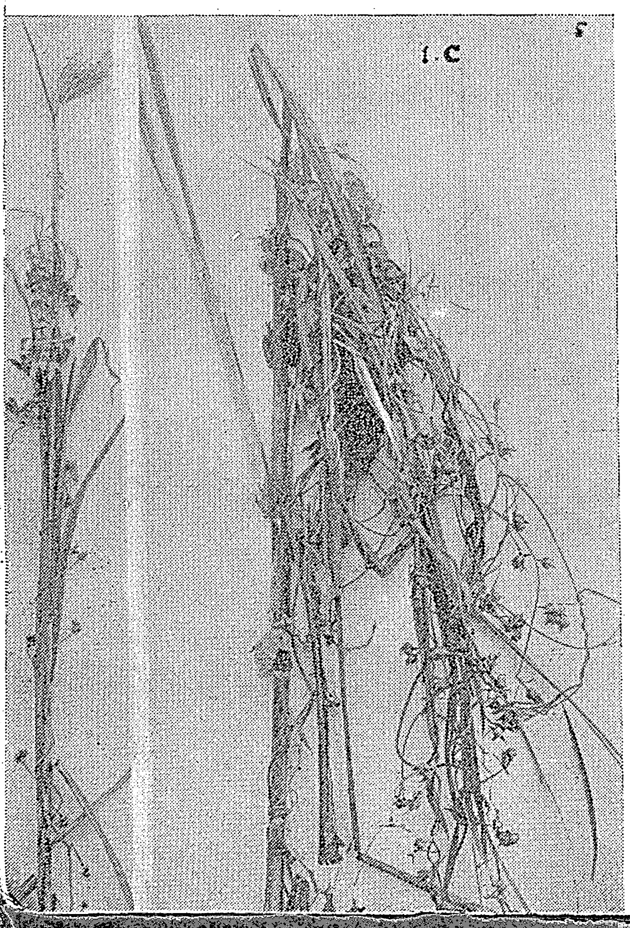
NILKALAMI (*Ipomea hederacea* Jacq) has become a menace to the sugarcane growers, causing a loss of 20-25 per cent in the affected fields.

It is one of the most troublesome weeds. It twines round the clumps and sprawls in the field covering four to five rows of the crop. Sometimes, it covers the entire sugarcane field and blocks passages. The sugarcane clumps, as a result of heavy strain, bend down and give the appearance of a hedge. Thus the cane tops are damaged, stalks remain undeveloped and the yield is reduced. The weed becomes most troublesome at the time of harvesting.

Nilkalami is an annual plant and develops only from seeds. The fresh fruits are used as vegetables and the seeds as a purgative.

A comparison of the affected and unaffected sugarcane clumps indicates that the height and the

The sugarcane top has been damaged by the weed. The growth of the plant has also been affected



A sugarcane field full of "I. hederacea". It shows how this weed twines round sugarcane clumps

weight of the affected clumps are reduced by 20 to 25 per cent.

A survey was conducted at the Pusa Farm (Bihar) to find out the affinity of the weed for the different varieties of sugarcane and other plants. The observations recorded indicated that the weed had a great affinity for sugarcane but did not seem to have any varietal preference. Practically all the varieties of sugarcane growing in the area were found to be affected with the weed.

CONTROL

Clean cultivation, pulling out the weed during the early stages of growth, hoeing and other tillage operations were found to be very effective in controlling the weed.

So far as the chemical control methods are concerned spraying with agroxone (one per cent at the rate of 100 gallons per acre), fernoxone (0.1 to 0.2 per cent at the rate of 100 gallons per acre) and phenoxylene 30 (0.3 to 0.6 per cent at the rate of 100 gallons per acre) gave satisfactory results. Further research in this connection is in progress at the Central Sugarcane Research Station, Pusa (Bihar).

INDIAN FARMING:

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DOES JUTE CULTIVATION EXHAUST THE SOIL?

By
B. C. KUNDU and M. K. MUKHERJEE
Jute Agricultural Research Institute, Barrackpore

As a result of partition, the best lands on which jute can be grown have gone to Pakistan, whereas with our changed economy, it has become necessary to produce more jute in the Indian Union. In 1947, at the time of partition, the area under jute in India was only 646,000 acres as against 2,059,000 acres in Pakistan. India's requirement is about six million bales (bale=400 lb.) of which 4.7 million have been produced in 1952-53 from 1,834,000 acres. This shows that during the last few years more than 11 lakh acres of new land have been put under jute. It is not precisely known as to how much of this area is double-cropped with *aman* (winter) paddy. In view of the food position of the country it is not desirable to divert any further area to jute alone. Double cropping in *aman* paddy lands is the only way to bring more area under jute.

Jute is considered by many as a crop which considerably exhausts the soil. In India, by soil-exhaustion, is generally meant depletion of soil-nitrogen. Jute responds to nitrogen very well. The increase in yield is sometimes to the extent of 100 per cent by the application of nitrogenous fertilizers. The increase is not restricted to any particular variety or locality. The response has been more or less universal. As Indian soils are poor so far as nitrogen is concerned, it is often apprehended in many quarters that without very liberal manuring (which is beyond the capacity of cultivators) double cropping with jute and paddy is an impracticable proposition, as otherwise, the already poor Indian soils will be further impoverished.

DOUBLE CROPPING EXPERIMENTS

Double cropping experiments conducted at the farm of the Jute Agricultural Research Institute have shown that the yield of paddy has not been affected (or if at all, to a very small degree) by growing jute as a preceding crop, provided that the transplantation was done at the correct time. Analytical data of soil samples drawn from small plots as well as big ones also show that the soil is not depleted so far as total nitrogen is concerned by growing jute. In the 1952-53 season, 36 comparatively small-sized plots were selected. Representative samples drawn from these plots (in which several varieties and degrees of manuring were included) were analysed particularly for total nitrogen. Mean of the total percentage of nitrogen (for 36 plots) before jute was 0.088 as against 0.991 per cent after jute. This shows that the soils have not been impoverished; on the contrary, they have become somewhat enriched in total nitrogen.

This at first seems somewhat paradoxical; more so, if the stages from sowing to harvesting of jute are considered. In broadcast plots 70-80 per cent and in line plots 40-60 per cent of plants are thinned out normally. This amounts to the removal of a considerable amount of green matter, which has been estimated to be 600-2,000 kg. (1,200-4,400 lb.) per acre, and the consequent withdrawal of proportionate quantities of nitrogen, phosphorus, potassium, calcium, etc. from the soil. The stand or population at the harvesting stage ranges between 80,000 to 2,00,000 per acre.

The gross withdrawal of nitrogen by the plants which are harvested may often amount to 100 kg. (200 lb.). About 60 per cent or so of the leaves are shed during the growth of the plant. Therefore, when determining the exhaustion, the natural return of the leaves, containing three to five per cent of nitrogen by weight, to the soil is to be considered. If the natural return of nitrogen from leaves to the soil is considered, the net exhaustion of soil due to plant growth amounts to 20-40 kg. (44-88 lb.) of nitrogen per acre. This amount is very difficult to determine by soil analysis; even then there should not be any increase in the total nitrogen content of the soils after a crop of jute, although this has been observed.

ROLE OF JUTE LEAVES

Investigations were undertaken to find out causes of this apparent anomaly. The fact that

Lodging in plots treated with compost (left): No-lodging in plots treated with superphosphate (right)

Spreading jute leaves in the paddy fields

organic matter increases the total nitrogen content of the soil has been well established. It was, therefore, thought that the leaves which are shed regularly into the soil after the plant has become two months old, may play their role in maintaining the nitrogen balance. Experiments carried out at this Institute have shown that incorporation of jute leaves into the soil increases the total nitrogen. One gramme of jute leaves has been found to fix any quantity upto 40 mg. of nitrogen. Total dry weight of leaves produced by a plant may be anything from 6 to 30 grm. depending on the size of the plant and the variety. Under certain field conditions, such as mentioned below, however, there may be no fixation of nitrogen at all:

(1) Moisture condition may not be optimum, i.e. it may be too little or too much
(2) There may not be thorough incorporation of the leaves into the soil
(3) Quick oxidation due to leaves falling of on the surface only
(4) Removal of the leaves by wind, etc.
(5) Insects eating away the leaves
(6) Leaves when fall become so dry and mature that in the absence of sufficient moisture in the soil, they may not decompose at all

That leaves are the main agency which maintains soil fertility in case of jute lands is also indirectly proved by another piece of work carried out at this Institute. It has been found in a field trial where ammonium sulphate, compost, and superphosphate were added from very small to very high doses in different plots, that there has been more leaf-fall in the case of plots treated with ammonium sulphate, so much so that before the harvest there was complete lodging which led to a further leaf-fall; in the plots treated with compost leaf-fall as well as lodging were less and in case of plots treated with superphosphate, the leaf-fall was minimum and there was no lodging. Mean of total per cent soil nitrogen was 0.101, 0.125, 0.081, before jute and 0.106, 0.128, 0.077 after jute for ammonium sulphate, compost and superphosphate treatments, respectively. From this it is seen that fallen leaves have maintained the soil fertility.

After the harvest the plants are usually stacked for three to four days before retting. During this time most of the leaves remaining with the plants fall. In this connection, it may be mentioned that bigger and maturer leaves fall, whilst only small, apical leaves are left on the plants. If after harvest, the plants are stacked in the field and the shed leaves are thoroughly incorporated into the soil, the soil may further be improved.

Incidentally, it may be mentioned that in Orissa dried jute leaves are used as manure in paddy lands. In some areas in the Hooghly district in West Bengal, the plants after harvest are spread

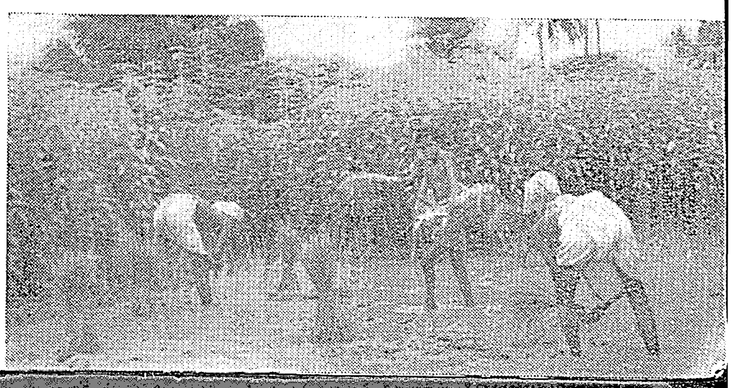
(*Continued on page 32*)

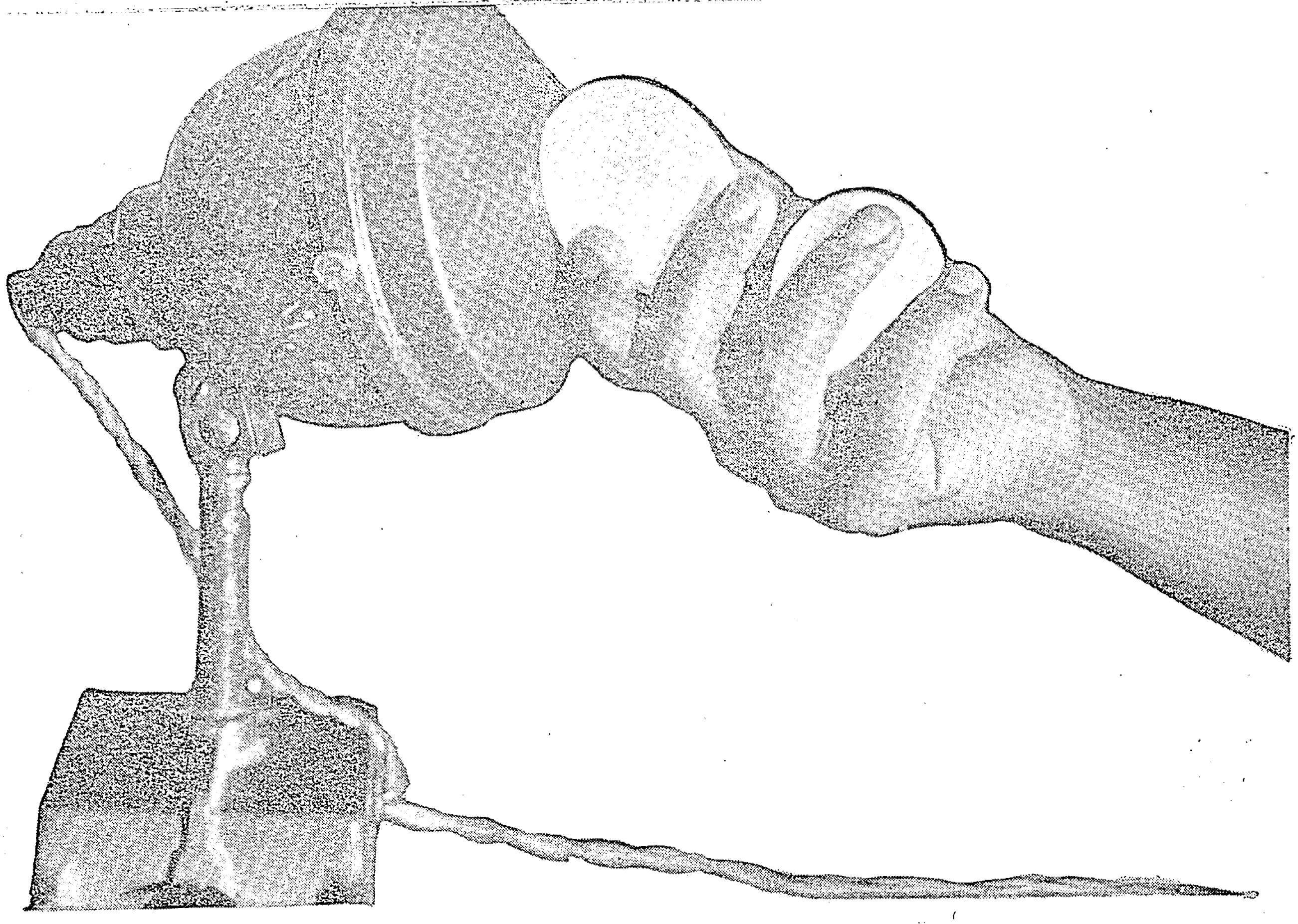
TABLE

Source	Substance	Unit	Minimum	Maximum
			Quantity of plant materials returnable to the soil	
Thinned out plants	Green plants	md./acre	15	50
Growing plants	Leaves	grm./plant	4	24
Plants at harvesting stage	Twigs and other non-fibre producing portions	md./acre	40	125
			Quantity of nitrogen returnable to the soil	
Thinned out plants	Green plants	lb./acre	20	70
Growing plants	Leaves	grm./plant	.2	1.2
Plants at harvesting stage	Twigs and other non-fibre producing portions	lb./acre	50	165

Spreading jute sticks in the fields before steeping (this practice is desirable)

Spreading jute leaves in the paddy fields



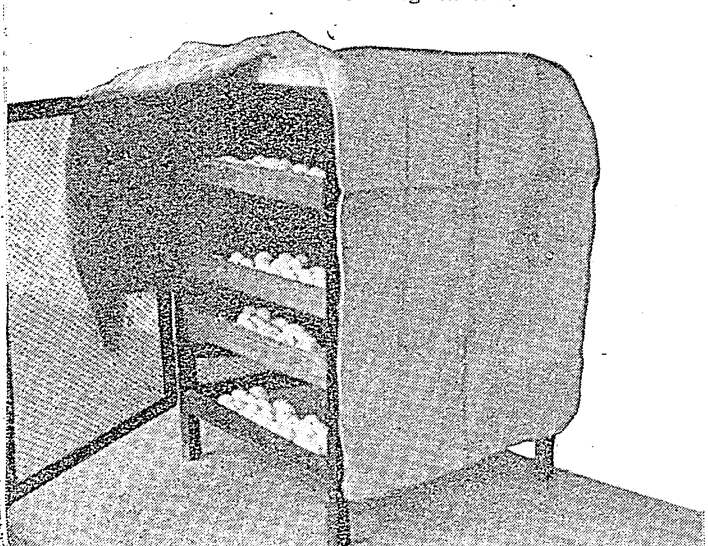


Egg candling

Eat more and

By T. S. KRISHNAN
Division of Poultry Research,
Indian Veterinary Research Institute, Izatnagar

Cooling cabinet



EGGS, though intended by nature for the propagation of the species, have been used as food by man from very ancient times. It is the egg of the domestic hen that is most widely used for this purpose by people in most parts of the world. The egg is rich in valuable proteins of high biological value, easily digestible fats of great energy content, essential minerals in readily assimilable form and important vitamins that are indispensable for the smooth and efficient performance of the various vital bodily functions. Consequently, it is admirably suited to serve as an efficient supplement to the poor and predominantly starchy diet of the average man of this country. In addition, it is a palatable food which can be served in countless ways, as a single dish or in combination with a variety of foods.

Eggs may be fertile or infertile. Generally, people are not aware that the presence of the cock is not necessary for the hen to lay eggs. The eggs laid

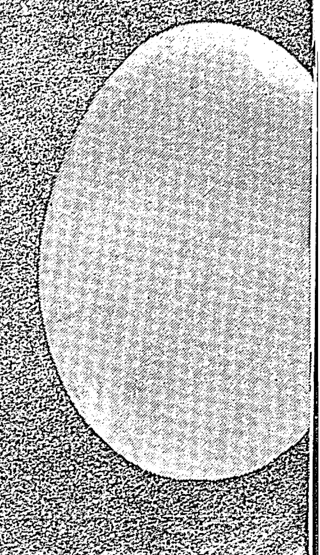
when there are no males in the flock will all be infertile, while those produced when the cocks are present in the flock would generally be fertile. Whereas both kinds of eggs can be and are used for table purposes, only fertile eggs can be used for hatching. Since the infertile ones have no life in them, not having been fertilized, they are often termed as vegetable eggs.

TESTING QUALITY OF EGGS

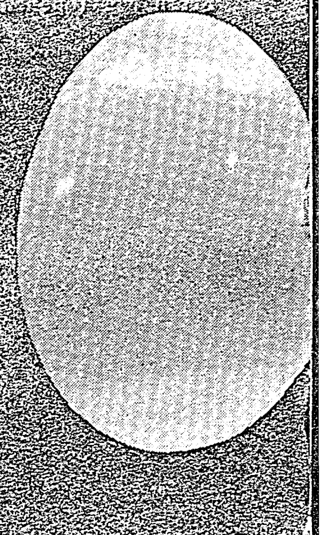
As with all other foodstuffs, quality and appearance are of very great importance in the case of eggs too. Though the presence of the shell is of great help in preventing adulteration and easy contamination of the contents with extraneous material, its opacity stands in the way of the ready appraisal of the true internal condition of the egg. Consequently, poor and inedible eggs are often passed off as good ones to the customers.

In the proper marketing of eggs they are tested and graded for their interior quality by what is called 'candling'. This is the term applied to the examination of the egg in front of a strong light, called the 'candling lamp', preferably in a darkened room. The modern candling lamp is often an electric light enclosed in a metal cover, provided with an internal reflector at the back and a small hole in front, through which the concentrated light issues. When an egg is held in front of this hole, some of the light penetrates into the interior of the egg, as the shell is translucent, and gives a view of the interior. By twisting the egg sharply, its contents are made to rotate, enabling a better view of the same.

Candling gives a picture of the quality and condition of the yolk and white as well as of the amount

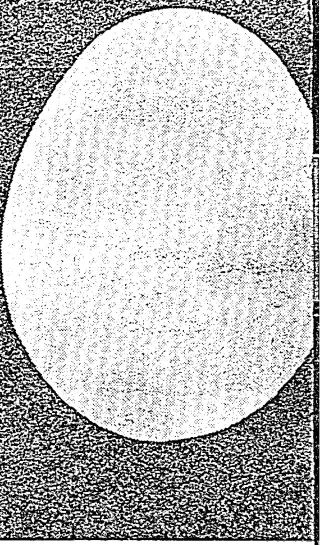


Fresh egg
(Candling appearance)

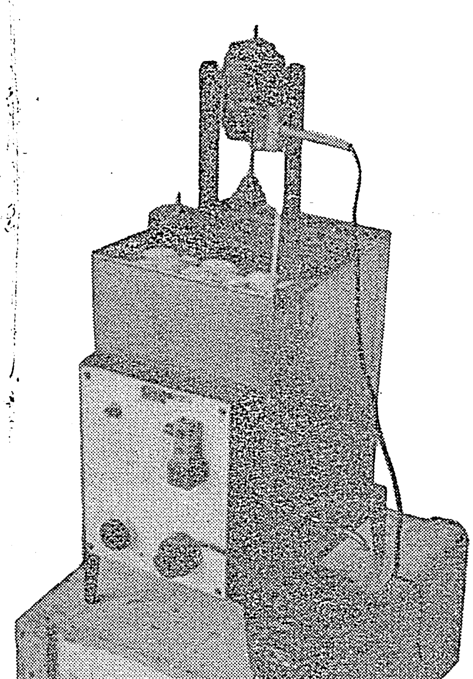


Stale egg
(Candling appearance)

better eggs

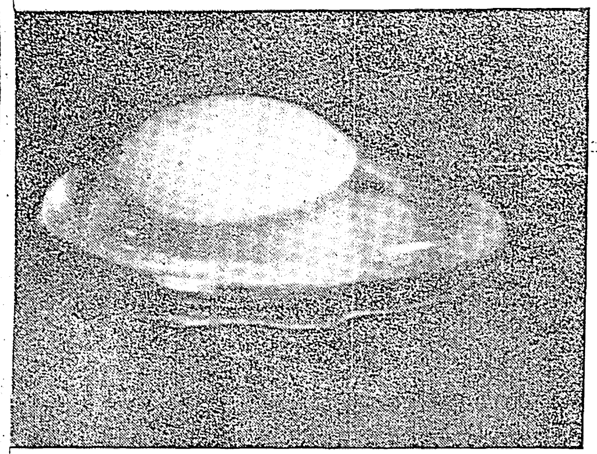


Developed embryo
(Candling appearance)

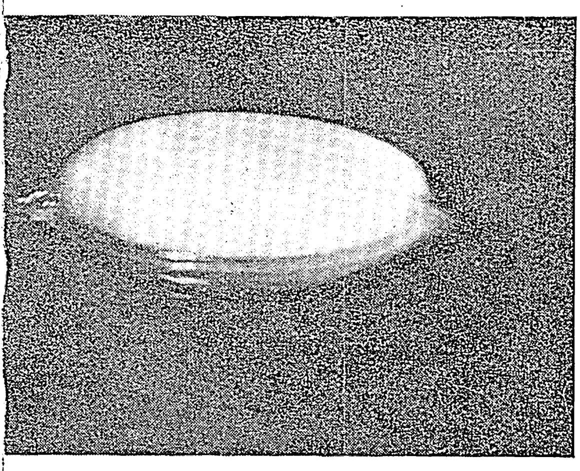


Defertilization
apparatus

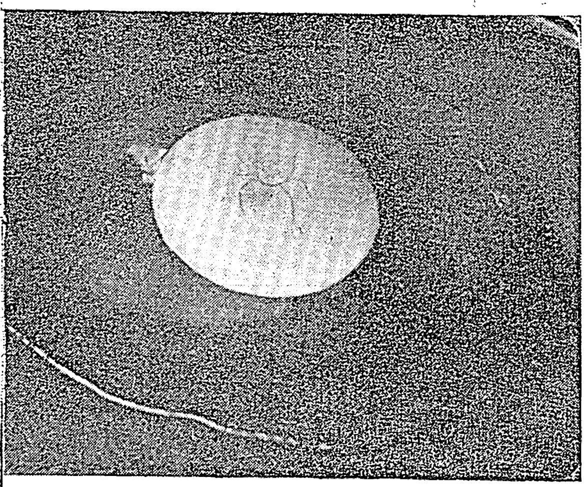
of shrinkage. It also enables the detection of shell defects like hair cracks, internal blemishes like embryo development, foreign bodies like meat or blood, or other faults like mould, rot, etc. When a fine quality fresh egg is candled, the shell would be found free of cracks, the air cell small and round, the yolk central, casting a pale shadow with a hazy outline, and the white, firm and clear. When such an egg is broken up on a plate, the yolk would be of uniform colour,



Fresh egg (opened out appearance)



Stale egg (opened out appearance)



Developed embryo (opened out appearance)

standing up well-rounded in the centre of a compact layer of firm albumen of good height and smooth, oval outline. It would also be free of internal blemishes, foreign bodies, or evidence of spoilage, as also of objectionable flavours and odours. A stale egg, however, being of poor quality, would show, on candling, a big air cell and a large and sided yolk casting a dark shadow with a well defined outline. The movement of the yolk would be either rapid or sluggish and straggling. On breaking up such an egg, the yolk would be well flattened out or ruptured, and the white, widely spread out and watery.

HOW QUALITY GOES DOWN

Most eggs are of excellent quality when freshly laid but the quality begins to deteriorate soon after that. The rate of deterioration is determined by the handling and storage conditions. Of the several factors influencing egg quality, temperature is the most important; high temperature accelerating and low temperature retarding the rate of deterioration. High temperature causes flattening of the yolk, liquefaction of the white and enlargement of the air cell. If the egg is fertile, the embryo also begins to develop. All these undesirable effects can either be stopped or greatly minimised by holding the eggs at a sufficiently low temperature. As with many other perishable foodstuffs, storage of eggs at low temperature delays deterioration, conserves quality and reduces losses.

STORAGE OF EGGS

Low temperature is the most important single factor in the successful storage of eggs. Without maintaining a sufficiently low temperature in the surroundings of the eggs, the quality of the eggs cannot be maintained at a high level with any other method even for a short period of a few weeks or days. For short periods of holding, as in the case of hatching eggs, the temperature is usually maintained around 50°—60°F., but in the commercial storage of table eggs over several months, the temperature is generally reduced to about 30°F. At such low levels changes due to enzymic, microbic, physico-chemical and other causes are reduced to the minimum. Such low temperature storage is the usual practice current in Europe and America, for the storage of the surplus of the spring egg production which is marketed in late autumn and winter seasons.

CONDITIONS IN INDIA

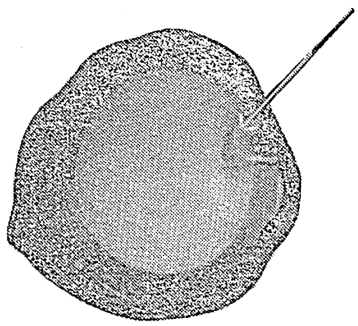
The problem facing most of the producers and traders in this country at present, is the control of tremendous losses suffered by them during the hot weather, mostly due to embryo development. This loss usually ensues within the few days required to transfer the eggs from the rural areas, where they are produced, to the urban population of the towns and cities, who form the bulk of the consumers.

The chief cause of this huge loss can be traced to the unsatisfactory and primitive methods of production and marketing prevalent here. The vastly preponderating proportion of the eggs is produced by individual farmers in the lakhs of villages in the country, each producing just a few eggs daily. All

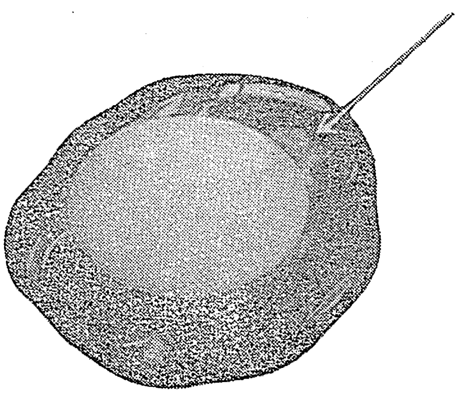
the eggs are usually fertile, since the males are always present in the flock. Generally, the summer temperature in the plains of most States of the Union is around incubation requirements, but the collection, packing and transportation operations are extremely crude and slow and all the handling is done under ordinary atmospheric conditions. In the bazaars, eggs can usually be seen displayed in the open, irrespective of weather conditions, sometimes the sun falling directly on them. Consequently, embryonic development proceeds apace and large numbers are rendered inedible in a few days, usually less than a week. The obvious remedy for preventing this loss would be to produce only infertile eggs, as the latter remain edible for a much longer time than fertile ones under similar conditions. Another way would be to keep the eggs cool by storing them in a refrigerator, or ice-box, or by other similar devices, transport them quickly to the markets and sell them to the consumers immediately, taking care that the eggs are not exposed to high temperatures in this period. These things, however, are not practicable under present conditions of production and marketing due to a variety of handicaps, such as poverty, ignorance, prejudice, disorganization, etc. with which the people engaged in this industry are faced.

USE OF LIME-WATER

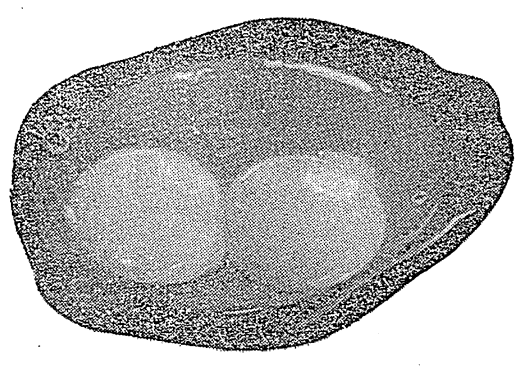
The villagers and others engaged in the egg trade employ a variety of indigenous materials like green *neem* or *shisham* leaves, bran, charcoal, ash, sand, paddy husk, salt, etc. to preserve the eggs till they are sold out. Controlled experiments carried out by the Division of Poultry Research, Indian Veterinary Research Institute, Izatnagar, have shown that they are practically valueless and in some cases even definitely harmful. Among the various materials investigated at the above Institute, lime alone has been found to give satisfactory results. The simplest and most efficient way of using it is as lime-water. Lime water is prepared by mixing freshly slaked lime with plenty of water and diluting it to the consistency of thin white-wash, stirring it frequently for two to three days, and decanting off the thin milk of lime suspension, which is used as the preserving liquid. Eggs are kept completely immersed in this liquid in glazed earthenware or similar containers. The excess lime in suspension, which settles to the bottom on standing, serves to keep up the strength of the preserving solution lost during storage and handling. Water lost by evaporation from the preserving solution is replaced regularly so that all the eggs are always completely sugmerged in the lime-water. The period for which eggs stored in this manner would remain in good condition would depend on the temperature of storage and the nature of the eggs. In northern India, if the storage is done during winter the eggs, whether fertile or infertile, would remain in good edible condition for about four months. If, however, they were stored during the summer they would keep fairly well for about four to six weeks, if infertile. Fertile eggs, even when preserved as above during this period, would go bad in about a couple of weeks, depending on the intensity of the heat.



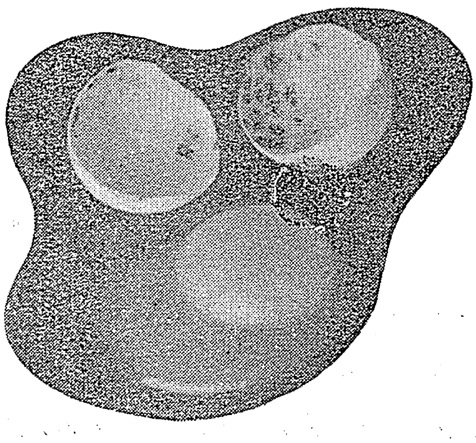
Blood spot



Meat spot



Double yolk



Mould

When eggs have to be transported to another place, the liquid lime-water, would be a handicap. However, eggs can be removed from the preserving liquid, sent to the desired place, and replaced in a similar medium, if intended to be kept for a further period.

It has also been found that the shell-pores could be sealed with lime by soaking the eggs in lime-water for a day. This treatment serves to improve their keeping quality by reducing the rate of shrinkage.

ICE-LESS EGG-COOLER

A very simple and cheap device, to serve as an ice-less egg-cooler, has been tried at the above Institute and found to be quite useful in delaying the onset of embryonic development in fertile eggs during the extremely hot, dry summer months. The cooling cabinet is constructed more or less on the model of a home-type meat safe, with wire netting on sides and bottom, and is fitted with wire-netting shelves for keeping the eggs. On top of the cooler a tray of water is kept and wetted hessian cloth is suspended on all sides with the upper end dipping in the water in the tray. The cabinet is then kept in a cool, shady verandah or other similar place where there is a free current of air. Due to spontaneous evaporation of water from the hessian cloth a marked drop in temperature inside the cabinet ensues. Fertile eggs stored in such a cooler, during the hot, dry months of May and June, have been found to show no germ development and remained in good edible condition for about 10 days, while similar eggs kept outside, at the same time, became spoiled within about four days, showing blood in the embryo. The employment of this cooler requires no great expenditure or high technical skill; all the attention it needs being to keep the water in the tray replenished to prevent its drying off.

DEFERTILIZATION OF EGGS

During the monsoon period, the humidity being high, the cooler described above, is not very effective, and losses due to embryo development continue unabated. To meet this contingency, a method has been evolved whereby the fertility in the eggs, which is the cause of such rapid spoilage, is destroyed and they are rendered as good as infertile ones. Eggs thus defertilized have been found to be fully equal, if not slightly superior, to naturally infertile eggs. The process is very simple—merely heating the eggs in water maintained at 55° C. for 15 minutes. It could be carried out by any one with average skill and at little expense. The adoption of this method on a wide scale, particularly at the primary points of large scale assembly, would lead to the complete prevention of losses from embryonic development, as the eggs do not develop an embryo after having been treated in the above manner. This would result in the saving of lakhs of eggs every year. This method was successfully employed by the Uttar Pradesh Government during the last war, in the supply of eggs to the Defence Services.

In order to further improve the keeping quality of the defertilized eggs, they may be stored in the cooling cabinet, if the period is only a few days, or

(*contd. on page 30*)

CASTRATION IN LIVESTOCK

By S. P. BERI, Animal Husbandry Deptt., Ajmer

CASTRATION of animals is very important for breeders who wish to improve their livestock, as by employing this method they can hope to obtain good results by the use of selected sires and judicious mating of males and females. It is useful in the case of those animals which are used for work, for it renders them more tractable and makes it possible to keep them in company with females and other males of the same species both at work and at rest. Male animals whose flesh is used for human consumption (cattle, sheep and pigs) are generally castrated in most of the Western countries, as they develop better, fatten more quickly and their flesh is less coarse. The operation is also performed in male fowls for production of more tender flesh and increased body-weight. According to Reynolds, in the case of sheep, the wool produced by the castrated male is considered to be of finer quality. Castration is also used for the removal of certain diseased conditions and accidental injuries to the testicles.

AGE AND SEASON FOR CASTRATION

The best age and season for castration are much debated questions. However, the following information may be useful for different animals:

Horse: The males of this species should be castrated between the age of one to two years. It is advisable to perform the operation during mild season avoiding acute cold and heat and rains. One reason for not performing the operation during and soon after the rains is the presence of too many flies which may cause contamination of the surgical wounds.

Cattle: Opinions differ greatly regarding the best age for castration in bulls. In fact not much data based upon controlled experiments is available on the subject. According to certain authors, the bovine species should be castrated at an early age, say from two to eight months. Stock-owners in India are generally of the opinion that the bulls should be castrated at the age of about two years to enable them to attain better physical development. There is no particular season of the year specially favourable for the operation.

Sheep and goats: Males of these species are castrated when about two months of age. The period of the year at which these animals are operated upon is dependent on the time at which they are born, choosing days with a little promising weather.

Boar: The young male pig is castrated when from five to eight weeks old. The best time is a week or so before it is weaned.

Buffalo-bull: Very little is known about the effects of castration in these animals. It was pointed out in the meeting of the Board of Agriculture and Animal Husbandry in India held at Poona in March, 1953, "that the Punjab breeders did not favour the idea of castration in buffalo-bulls as they felt that the animal after castration simply withered away in vigour".

Fowl: The best results are obtained by performing this operation just before the combs are formed, or as early as it is possible to distinguish between the sexes easily from the external characters.

METHOD OF CASTRATION

It is beyond the scope of this note to give operative procedure for castration in different animals, which requires a lot of technical knowledge and can only be understood and practised by qualified veterinarians. There are numerous methods of performing this operation, which vary somewhat in different species.

One method used by the quacks in the villages of our country is still in vogue at some places. This consists in the destruction of the testicles or the vessels leading to them or both by hammering them between two hard objects like wood, until they are crushed. This method is popularly known as 'mulling'. This hammering operation generally takes a long time, which is barbarous, as it inflicts much suffering and pain on the subject.

A veterinary assistant surgeon performs the operation of castration by several methods, one of which consists in removing the testicles surgically and which is usually adopted in the case of horses. In the case of cattle, the operation is performed in a bloodless manner by not removing the testicles. The operator uses a large instrument resembling a pair of pincers, which is called Burdizzo's Emasculator. The vessels (spermatic cord) leading to the testicles are interposed between the jaws of the instrument and are pressed for about a minute, which is sufficient to crush the cord of the testicles and sterilise the animal. The instrument is constructed in such a way that with a small force applied at the handles, a great pressure is exerted at the pressing jaws. The testicles may get slightly swollen for about a couple of days after the operation, but the animal exhibits no inconvenience. No after-treatment is necessary. The castrated animal can be sent back to the herd immediately. In the case of sheep a smaller Burdizzo's Emasculator is used in exactly the same manner as described above for cattle.

ADVANTAGES OF BURDIZZO METHOD

The main advantages may be briefly enumerated as follows:

(a) Crushing by the quacks takes a longer time, while the Burdizzo method takes only a couple of minutes.

(b) The amount of pain caused to the animal by the barbarous method of crushing is too much as compared to only slight pain with the Burdizzo method. As the time taken for the operation is very short, no anaesthtic is required. If the owner is very keen to get the operation done under anaesthesia, the veterinarian can even do that causing absolutely no pain to the animal.

(c) The after-effect of crushing will often last for weeks and an abscess frequently forms at the seat of operation. There are practically no after-effects in the case of Burdizzo method except a slight swelling which disappears in a couple of days.

MANUFACTURE AND PRESERVATION OF SEMI-DRIED PRAWNS

By
R. VENKATARAMAN and A. SREENIVASAN
Fisheries Technological Station, Kozhikode

PRAWNS are one of the six commercially important fisheries of the West Coast of Madras State. Besides this large quantities are also fished in backwaters of Pulicat lake and in the fresh water Collair area. Good prawn fishery also exists on the East Coast in the Muthupet Swamp near Pt. Calimere. Very large quantities of the catches are simply strewn on the sand to dry. This crude method is known as beach-drying. Slightly better methods are prevalent in the Circars where the prawns are smoked, or boiled and dried. The dried prawns are packed in gunnies and beaten by clubs to remove the shell and the 'prawn pulp' so obtained is widely exported, especially to Burma.

The semi-drying technique was evolved and perfected by the Madras Fisheries Department. As the very name indicates, the product is not completely dried, but dried partially giving a pulp which retains all the qualities of fresh prawns.

There are four unit processes in the manufacture of semi-dried prawns, viz. (1) blanching (2) shelling (3) brining and (4) drying.

BLANCHING

To begin with the prawns are freed from accompanying weeds, fish fry, gastropod shells, etc. and weighed and washed in water to remove adhering dirt. They are then 'blanched'. They are dropped into a boiling solution of four to six per cent salt (four to six pounds salt per 10 gallons of water) in a tinned copper vat. The blanching lasts for two to three minutes, i.e. till the prawns float and become pink in colour. Blanching results in the inactivation of digestive juices (autolytic enzymes), in making the tissue easily penetrable to salt and in developing the pink colour. It was found that by blanching, 98.42 per cent of the bacteria originally present in prawns were killed and that the moisture was reduced by 11.0 per cent. This explains the importance of blanching.

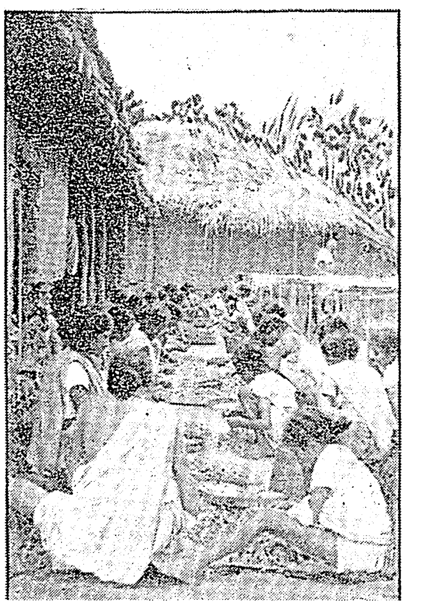
SHELLING

The blanched prawns are removed from the vat by baskets, excess brine drained and the prawns spread on mats for drying. Shelling is done by hand—the head being removed first, followed by the shell round the body and finally the tail being squeezed out from the meat.

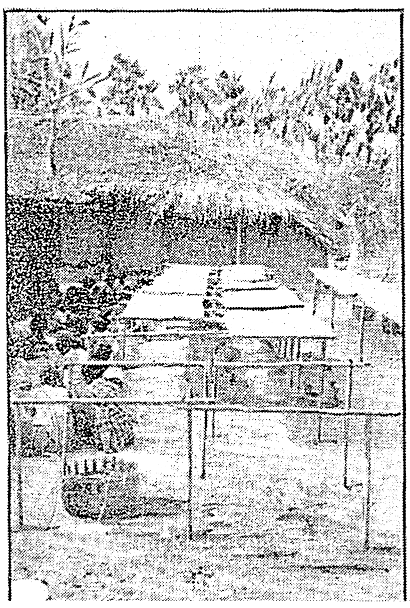
BRINING

The pulp (the resultant product after removal of shell) is collected in baskets and dipped in saturated salt solution-25° Bé (theoretically three pounds salt per gallon of water, but in practice four pounds per gallon has to be used to allow for impurities, etc.). Brining is done in enamelware, but as an alternative, wooden tubs may be used, though these are less hygienic. Fifteen minutes may be allowed normally for brining but if prawns are of large size a few more minutes, upto 20 minutes may be allowed. After brining, the meat is removed in bamboo baskets and drained of excess brine. Brining is an important process since this accounts for a reduction of 99.45 per cent of bacteria originally present and 17.30 per cent of moisture. Salt penetration is 9.64 per cent. By reducing the moisture and increasing the salt content spoilage is retarded.

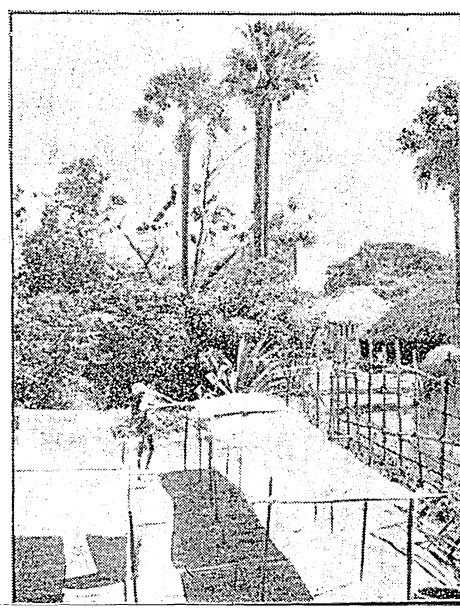
Shelling of prawns



Bamboo "thatties" on scaffolds for drying prawns



"Thatties" on scaffolds for drying prawns



DRYING

Solar heat is cheapest for drying the prawns. The brined prawn meat is spread on bamboo *thatties* erected on wooden scaffolds. Drying trays made from palmyra leaf fibre from Tuticorin were more efficient in that cutting up of prawn meat into bits which occurred while overturning in sharp bamboo *thatties*, did not occur in this smooth fibre. For a humidity of 76 to 82 per cent and a temperature range of 78° to 90°F about six to seven hours drying is sufficient. The drying is deemed to be complete, when the prawns have a 'rubber like' feeling with fine lozenge-pink colour. During inclement weather 'artificial drier' has to be used.

STORAGE

The semi-dried prawns prepared as above can keep well for two to three months in bamboo baskets lined with butter paper and stored in a cool, dry place. Butter paper and cellophane could be used for packets, but of late 'alkathene', an Imperial Chemical Industries polyvenyl plastic, has been very widely used. It can be heat-sealed and prevents dehydration and vermin attack. Semi-dried prawns sealed in 'alkathene' packets keep well for several weeks, and at low temperatures for several months.

Carbon dioxide packing of semi-dried prawns on a commercial scale was successfully carried out at Tanur Experimental Station and later at Akividu in Collair area. Laboratory experiments proved that semi-dried prawns packed in tins with sodagas and sealed keep in good condition for eight months or more.

NUTRITIVE VALUE

As a result of semi-drying, the nutritive value was not at all impaired. The product is rich in proteins, phosphorus, calcium and iron. It is equal to, if not better than, other flesh foods in nutritive value, and for the same protein value is cheaper.

DIRECTIONS FOR USE

The semi-dried prawns must be soaked in warm water for 10 to 15 minutes to remove excess salt, and then may be fried in *ghee* or oil with condiments or in any

(*Contd. on page 26*)

Culling A MEANS FOR IMPROVEMENT OF SHEEP

By
B. B. BUCH and S. JAYARAMAN

SELECTIVE breeding and hence culling or elimination of inferior stock is the first step towards the improvement of livestock. A sheep breeder should always aim at enhancing the standard of production of the flock although this is not so quickly or easily accomplished. However, definite and marked improvement can be effected in the course of some years if the breeder is determined to do it.

Before thinking of culling, it is necessary to follow certain set principles of systematic breeding. In India, it is a common practice among flock-owners to breed their flocks all the year round. This practice is defective. Along with other advantages, fixing up of the breeding season is very helpful in facilitating a culling programme. After fixing up a regular breeding season, the breeder should limit his flock to an adjusted number and the aim must always be to maintain this number among the adult stock. Every year, as each batch of female lambs reaches maturity and is to be added to the flock, the breeder can exercise his discretion in selecting the best and top ones from the flock of young ones and culling poor and uneconomic ones from the adult stock. The number of adults to be culled will naturally depend upon the number available for replacement from amongst the young stock. The stock that is to be culled is known as 'culls', while the young ones which are to replace these 'culls' to keep up the total number in the stock are known as the 'replacement stock'. Factors of economic importance like fertility, wool quality, body-size, quality and growth of lambs, fleece-weights, etc. form the basis for culling.

FERTILITY

A matter of primary importance for carrying out a culling programme satisfactorily is the number of young ones available for replacement. Obviously, when the number of fertile ewes is more, the number of young lambs available will also be more, and hence there will be possibility of culling a greater number of ewes. To secure maximum advantage, a vigilant eye should be kept on irregular breeders and under no circumstances such ewes that lamb every alternate year or every two years should be retained. They must be culled as soon as they are spotted. This is probably an inherited character for which it demands a very careful attention. The progeny of such irregular breeders should also be culled so that this character is eliminated from the flock altogether in due course.

QUALITY AND GROWTH OF LAMBS

The object of culling will be served only if the yearling ewes for replacement are quite upto the standard for breeding, wool quality, fleece-weights and such other characters of economic importance. Evidently, quality and growth of the lambs become important factors for consideration. Usually, good, healthy and well-built sheep will give birth to healthy lambs. The condition of the lamb at birth may not be of great significance to the flock-owner as its condition after the weaning age and when it reaches maturity. To obtain healthy and sturdy lambs and maintain their good condition till weaning, the ewes must be good milkers and should be able to supply adequate nutrition to the young lambs till that time. For quality of mutton, heavy lambs with fleshy constitution should be selected and the rest culled. If ewes with heavy body conformation are kept, the mutton production can be increased because the lambs produced by such ewes are likely to be of good body conformation. Anyway, ewes with poor body conformation giving a leggy appearance should not be retained in the flock.

Old ewes in the flock are a great handicap because special care is needed in their feeding. They are not able to graze properly and digest the food because their teeth are worn out. As a result of this, they remain sickly and the productive capacity is lowered. At the time of culling, therefore, aged ewes are the first to be entered in the list of 'culls'. Sometimes, on stud farms, where the objective is to obtain the best inherent characters in the flock, old ewes may be required to be retained. Though, by themselves they may not be economical, their progeny will be highly valuable and under such conditions they may be retained till they are able to breed.

WOOL QUALITY

Indian breeds of sheep produce only carpet-type wool and none of them produces wool conforming to the standard or quality required for apparel use. The principal drawback is the presence of hair and kemp in the fleeces which lower their market value to a con-

siderable extent. Elimination of hair fibres from the fleeces is absolutely necessary if the wool is to be sold for better prices for utilization in the manufacture of clothing material. Improvement to this extent is not possible for all breeds of sheep only through selection, but regular and rigid culling practices can definitely improve the quality of the fleeces to the standard of an ideal wool. The best line of action, therefore, would be to cull those sheep which have a higher percentage of hair fibres. In course of years proportion of wool fibres can be increased if regular culling is practised. This has been experienced at the Government Livestock Farm, Hissar, where valuable results have been achieved in this direction.

Uniformity in quality and the length of wool, are of great importance from marketing point of view, and hence, deserve careful attention. These characters, though heritable, are not so quickly transmitted to the progeny. Hence, more emphasis needs to be placed on these factors at the time of culling every year.

WOOL GROWTH

The returns on the farm depend on the total production, and hence, the amount of wool produced by an individual sheep has a direct relation with the total returns. A very natural instinct will tell an intelligent farmer that ewes with low fleece-weights should be discarded. Although this is quite true, it is necessary to take into consideration whether the ewe with low yield has shown this character as a result of sickness, improper nutrition, external parasites and the like during the period of wool growth. In case these factors have not interfered during the period of wool growth, low yielders may be culled. Improvement of fleece-weights takes a longer period than other factors of economic importance because this factor is not so highly heritable like some other factors such as body-weight, staple length, etc. Maximum importance should, therefore, be given to this point particularly when the object is wool production.

QUALITY OF FLEECE

Culling on the basis of length and weight of the fleece will be very effective in increasing the yield per sheep. Culling for length of wool is easily and readily accomplished. It should be done while the wool is still on the body of the sheep and at shearing time when the sheep are carrying the maximum possible growth of wool. It can be easily accomplished as the flocks are brought in for shearing, and hence, the sheep should be brought in an hour or two earlier when they are to be shorn. When the sheep are examined for length of wool and quality, it is better to examine a particular portion on the body of the sheep. The same portion should be examined for all sheep. This will ensure culling on a uniform basis. This practice can be easily understood if one is aware of the fact that the length and quality of wool are not uniform in different regions of the same fleece. To achieve best results the fleece on the side of the rump should be examined. Along with the length, corresponding fleece-weight should also be taken into consideration. In short, while examining the sheep at the time of culling, sufficient emphasis should be placed on the proportion of wool fibres, freedom from kemp fibres and staple length. Ewes showing a good staple length, high fleece-weights and minimum proportion of hairiness are to be grouped in one lot, those coming below the desired standard being earmarked as 'culls'.

CULLING OF RAMS

The breeder should not overlook the fact that the ram also wields a very pronounced influence on the flock. The ram is actually of greater importance than the ewe as one ram will be responsible for transmitting his character to a greater number of progeny, and for this reason very rigid culling has to be practised in the case of rams. Although the general principles for culling the rams are the same as in the case of ewes, it is important to have superior rams in the flock with a better standard than in the case of ewes. As the staple length of wool in general in the offspring is the average of the parents, crossing short-wooled ewes with long wooled rams should be practised if improving the length of the staple is the aim. The elimination of kemp and hair from the fleece of the ram is of greater importance than in the case of ewes as both these charac-

ters are heritable. If no ram is available on the farm without kemp and hairiness, it is advisable to go in for a better ram from a good stud farm and purchase such rams every year according to the needs.

PROPER BREEDING

Another point of importance is the method of breeding to be employed to ensure effective culling. The usual practice of allowing any ram to serve any ewe irrespective of the consideration whether their breeding will result in a better progeny or not, is a faulty one. Mass breeding without selective mating reduces the general standard of the flock to a medium rather than a higher one. For definite and speedy improvement, it is advisable to breed long-stapled rams with long-stapled ewes for raising replacement stock. This will produce better yearlings than the average flock every year and thus the ewes of medium standard could be reduced year by year.

OTHER TIPS FOR CULLING

Culling chutes may be used to facilitate the operation while going over the sheep. It is nothing but a special device with a passage prepared so that only one sheep can pass through at a time. This passage is bifurcated at the end. One door is provided in the centre so that either of the passages can be blocked while the other one remains open automatically.

The culled ewes should be properly marked before they are mixed up in the flock. The branding paint used in marking the 'culls' should not be of a fast colour as it may give a permanent mark on the fleece thereby reducing its value.

At the time of weaning certain weak and apparently poor lambs are culled and sold out while from the rest of the young stock which are weaned, selection is made for replacement of the 'culls' in the parent flock. This minimises the expenditure on unwanted lambs as they are sold before weaning. At the time of selecting the ewe lambs which are to replace the culled ewes in the flock, it is better to keep about 10 to 20 per cent more than actually required for replacement, to guard against any mortality in the parent flock. It is also probable that some of the ewes may not develop upto the required standard for a few months after the culling has been done. Such ewes, or ewe lambs which were added to the parent flock, may be culled after four or five months from first culling. At the final culling, only the number needed for replacement should be retained.

Effective culling on the production basis will in the long run prove to be a valuable means of increasing the standard of production in any flock. Culling itself is the foundation towards building up a highly productive and almost ideal flock.

MANUFACTURE AND PRESERVATION OF SEMI-DRIED PRAWNS

(*Contd. from page 23*)

other way. These can be ground to a paste and fine cutlets can be made. The Superintendent, Fisheries Technological Station, Kozhikode, will be glad to furnish recipes on the various methods of cooking semi-dried prawns.

BY-PRODUCTS

The prawn shells, which are usually thrown away as waste, are utilized as fish-meal for feeding poultry and cattle. Prawn-shell meal though it contains less of protein than other fish-meals (42 to 45 per cent) is richer in calcium and contains a fairly high amount of phosphorous also.

CONCLUSIONS

Semi-drying is a very simple process and requires simple equipment which will be available in every home. Hence, in prawn fishing centres like Saurashtra, Cutch and Orissa this can very well form a flourishing cottage industry. The semi-dried prawns prepared by the family can be sold in weekly *shandies* and thus form a supplementary source of income to the fisherman with cheap salt and fuel and no labour charges (if the household members attend to shelling, etc.). The cost of manufacture will be very little and these cottage industry products could then compete favourably with the products turned out by large scale manufacturers.

THE PAINTED BUG, BAGRADA CRUCIFERARUM KIRK (Contd. from page 9)

Early in autumn these become active again and thus the life-cycle is repeated.

CONTROL MEASURES

As in the case of many other pests of agricultural crops, *Bagrada cruciferarum* also multiplies from unobserved few to millions on account of its high prolificacy. So it is very important that the pest be controlled in the early stages when its population is small. Cultivators should take to prompt and effective control measures as soon as the bug makes its first appearance in the field to subjugate the pest. The following control measures are recommended:

1. As *Bagrada cruciferarum* is polyphagous in habit, it is very important that we should not allow any weeds or other plants to grow in the field or near the field. Clean cultivation is very important to control this pest effectively.

2. Spraying the infested crops with soap solution, one pound in six gallons of water, will kill eggs and nymphs.

3. Spraying with fish-oil-rosin-soap solution, one pound in eight gallons of water, at the rate of about 30 gallons per acre will give good results in the case of eggs, nymphs and adults.

4. Dusting with 0.1 to 0.25 per cent BHC has yielded satisfactory results in the control of the pest in the farms at the Indian Agricultural Research Institute. This should be done under expert supervision.

5. Where the eggs or nymphs hide in crevices in the field, irrigating the field with crude-oil emulsion from two to five pounds per acre, according to the degree of infestation, has yielded satisfactory results.

The pest is also to some extent kept under check by its natural enemies. Two chalcid parasites, *Liophanurus* sp. and *Typhodytes* sp. parasitise the egg-masses. The adult bug is parasitised by a tachinid fly, *Alophora* sp.

 (*Contd. from page 7*)

The yields indicated that the early and medium-maturing varieties gave a better response than the late-maturing ones. Brunker 10, the earliest of the lot, gave the highest mean yield of 348 maunds per acre compared to 316 maunds from Weston 11 which was kept as a standard. Weston 11 took about a week to ten days more than Brunker 10 to come into full bloom. The next in order was Fulgham 15 which took ten more days as compared to Weston 11. The forage yields from both the late-maturing varieties, i.e. FOSI/29 and Algerian 19, were much lower than the standard. These varieties began to bloom towards the end of March or early April, when it became warm at Sirsa and scarcity of water was felt. The fertilizers also instead of enhancing vegetative growth affected it adversely and thus caused lower yields. Under favourable conditions, i.e. a cool spring and adequate moisture, they would make very good growth and give very significant response to fertilizers also.

With the early advent of the hot season and water scarcity, it was desired to grow only early-maturing varieties which would be able to complete their growth period before it became warm and give reasonable response to the application of fertilizers even with restricted moisture.

BERSEEM

Berseem, an excellent *rabi* leguminous forage crop, has begun to be grown quite extensively in the irrigated areas of the Indo-Gangetic plain. Deep and well-drained soils, rich in lime, fairly heavy in texture, are the best suited but not essential for its satisfactory growth as it will grow on almost any soil that is able to produce a good crop of maize.

It is widely grown in rotation with such non-leguminous crops as maize, sorghums, or rice because it increases the fertility of the soils. The ease with which it is possible to get a good stand of the crop by broadcasting the seed material inoculated with berseem culture in standing water, together with the high quality of forage it produces, and the improvement in soil it brings about accounts for its very important position in the agricultural economy of the rural and suburban areas. It is in fact a cash crop in the vicinity of the towns in the Punjab. Adequate moisture supply, however, is a necessary factor for its production. It is replaced by *senji, metha* under conditions characterized by shortage and by lucerne in areas with restricted irrigation to meet shortage of green forage in dry regions.

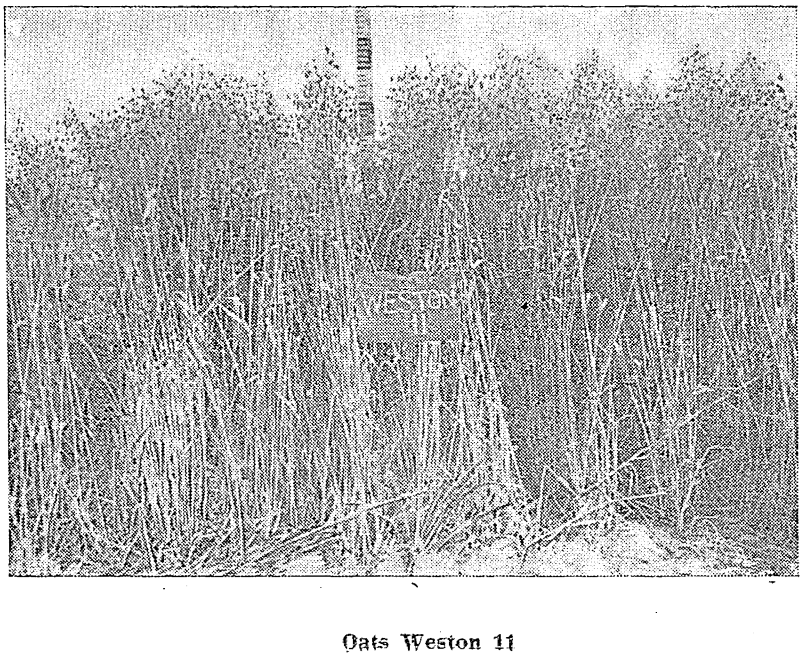
Berseem crop makes a vigorous vegetative growth in the moderately cool season. Very severe cold and frost kill the tops and inhibit its growth.

The experiments to study the response of the crop to various fertilizer treatments were conducted at the Jullundur Agricultural Station Fodder Research Station, Sirsa. The treatments included in the tests at these places were as follows:—

1. JULLUNDUR AGRICULTURAL STATION:

(i) Ammonium sulphate 100 lb. nitrogen per acre

(*Contd. on page 32*)



Oats Weston 11

 (*Contd. from page 11*)

ACHIEVEMENTS

It is estimated that nearly 20 lakh animals used to die in India annually due to rinderpest before the vaccine and sera against this disease were used. Since 1901, there have been efforts to find out various effective agents to combat this disease. The rinderpest virus was passed through goats, rabbits, and developing chick embryo and each one of these represents a safe, sure and effective protective agent saving the lives of lakhs of cattle. The problem of mass-scale manufacture has been solved. The vaccine can be kept for long periods by the special process of freeze-drying in a highly specialised equipment, known as Centrifugal-freeze-drying equipment. It is certainly now known that rinderpest can be controlled and even eradicated provided the campaign is organised on a short-term basis and finances are available.

Next to rinderpest is haemorrhagic septicaemia in cattle which takes a heavy toll. Effective vaccines are available against this disease also.

Brucellosis or contagious abortion is a disease of great economic and public health importance. It can be effectively controlled by the use of diagnostic agents and vaccine.

Anthrax is now a controllable disease. Effective vaccine is available which gives protection against the disease for nearly nine months.

In India, poultry industry was a hazardous pursuit even a few years back due to ranikhet disease, fowl cholera, and fowl pox. Vaccines against these have been found out and standard products are now available which have gone a long way in saving the nutrition-providing industry.

DISEASE CONTROL—A PRIME NECESSITY

As described earlier, our animals have become poor in condition, stunted in size and are unproductive. Poor quality and insufficient food, trying climate and lack of proper breeding policy seem to have brought about these results. Scientists are experimenting to improve the present condition. Meanwhile we must not allow our animals to die or become unthrifty due to chronic maladies. We have effective biological products which can save a poultry farm from the scourges of ranikhet disease, foul pox and fowl cholera.

Similarly, there is no reason why we should allow animals to die of rinderpest, septicaemia, black quarter or anthrax. Our efforts before launching any programme of livestock improvement should be to protect animals from these maladies.

Fortunately, there is an awakening among our people. Our villagers are very keen about keeping their livestock healthy by the use of veterinary biologicals and the demand for these products in India has increased significantly. In order to cope with this increased demand the State units are also supplying veterinary biologicals within their respective areas.

EAT MORE AND BETTER EGGS - - - - - - - - - (Contd. from page 20)

preserved in lime-water, if desired to be kept for longer periods. Keeping them in regular cold storage also lengthens their life very much. When eggs have to be sent over long distances during summer, especially when there are transport difficulties leading to delays in transit, the best method of conserving their quality and minimising deterioration would be to defertilize them, seal the shell-pores by immersing them in lime-water for a day and then despatch them to the desired destination.

In all cases it is imperative that the defertilization of the eggs be carried out as quickly as possible after they are laid in order to retain as much of the original quality as possible and get maximum benefit from the process. Once embryonic growth has commenced, or quality seriously lowered due to any cause, the defect cannot be rectified or the original quality restored, by any known means and as such the extra trouble and expense of defertilization in such cases would be useless.

The adoption and widespread employment of the comparatively cheaper and simpler methods described above, by the people in the egg trade in this country, would help reduce losses considerably, particularly in the hot weather. This would also enable more eggs to be marketed, thereby increasing the profits of the traders and contributing to the better nutrition of the people. The consumers too, would be getting more and better eggs, and perhaps cheaper too, because of low losses.

EDITOR'S PAGE - - - - - - - - - - - (Contd. from page 3)

adjust it to particular regions or to particular times. Then there is also the question of personnel. It is generally admitted that there is a dearth of suitably trained persons well-acquainted with the technique of information work in this country. Any undue impatience with such handicaps in hastily patching up and carrying out any programme of information service will most probably lead to disastrous results and inevitable failure because success will ultimately depend on those who are charged with its operation and working.

There cannot necessarily be any blue-prints of information work which can be forced down on the farmers of this country. Any plan of work will have to be built up preferably from below upwards so that the farmer may not feel lost in a scheme of things which has been planned from above without any consideration or sympathy for him.

EFFECT OF FERTILIZER TREATMENTS

(*Contd. from page 28*)

(ii) Ammonium phosphate 100 lb. P_2O_5 per acre

(iii) Ammonium nitrate 100 lb. nitrogen per acre

(iv) Superphosphate triple 125 lb. P_2O_5 per acre

(v) Control.

2. FODDER RESEARCH STATION, SIRSA:

(i) Ammonium sulphate 60 lb. nitrogen per acre

(ii) Superphosphate 30 lb. P_2O_5 per acre

(iii) Ammonium sulphate 60 lb. nitrogen plus superphosphate 30 lb. P_2O_5 per acre

(iv) Farmyard manure 375 md. per acre

(v) Farmyard manure 750 md. per acre

(vi) Control

Fertilizers were applied at the Jullundur Agricultural Station after the first cutting. The farmyard manure and superphosphate were applied about a month ahead of sowing and ammonium sulphate was broadcast in three equal instalments during the growing period of the crop at Sirsa.

The crop was sown at the usual sowing time by the end of September on sandy loam soil at the Jullundur Agricultural Station and loamy soil at Sirsa. It made quite satisfactory growth and was cut for forage.

The cuttings of forage were taken during the growing period as and when the crop was ready for harvesting. The crop was cut for the first time in November and subsequent cuttings were taken at intervals of about a month and a half. Early setting-in of hot season due to the failure of winter rains coupled with inadequate irrigation water invariably caused great reduction in forage production in April especially under conditions obtaining at Sirsa.

The application of fertilizers definitely enhanced forage yields at both the places, viz. Jullundur and Sirsa but differences were not significant. The berseem crop without the application of manure also gave quite good yields but in view of the special importance it occupies, any increase in yield as a result of the application of fertilizers is advantageous to the farmer. The phosphatic fertilizers as well as farmyard manure are superior to other nitrogenous fertilizers in enhancing forage yield in berseem to the extent of 27 per cent and 12 per cent and are more effective on sandy loam soils than loamy ones.

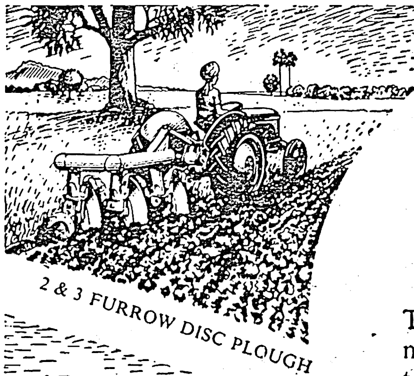
DOES JUTE CULTIVATION EXHAUST THE SOIL?

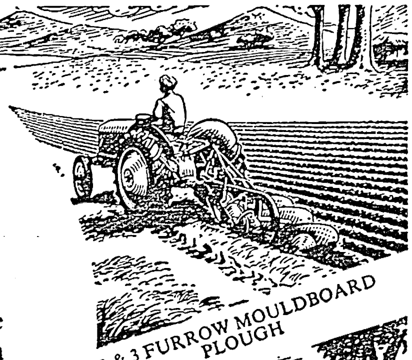
(*Contd. from page 15*)

in the field and are steeped after complete shedding of leaves. In case of jute, the non-fibre producing portion often varies from 7 to 30 per cent of the total weight of the plants, depending on the variety cultivated and the cultural and manurial practices followed. The green weight is from 1,600 kg. (3,400 lb.) to 5,000 kg. (11,000 lb.) per acre. If these are returned to the soil, the soil will be further benefited.

CONCLUSION

It has been shown that in case of jute, normally the soil nitrogen, which is exhausted during the growth of the plant is replenished by the normal leaf-fall which occurs during the growth of the plant. With careful manuring and a little care taken by way of adding the thinned out plants to the soil and the twigs and other non-fibre producing portions at the time of harvest, and stacking the plants in the fields before retting, a crop of jute is more likely to enrich the soil than impoverish it. From the table given elsewhere in this article, the possible enrichment of the soil may be seen.





Freedom from want

The soil of India can and must be made to yield a further seven million tons of food a year to defeat malnutrition. Even this will only mean an increase to just under 14 ozs. in the daily diet of every person in the country.

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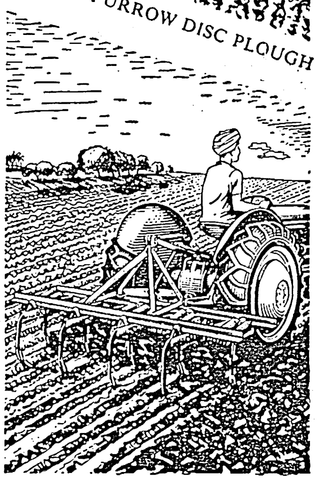
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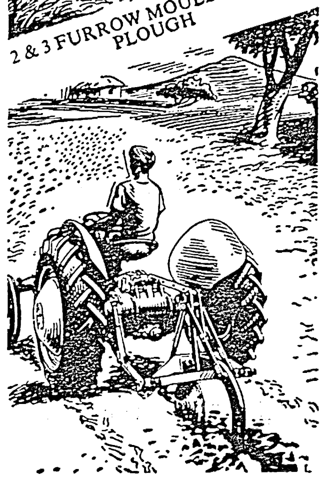
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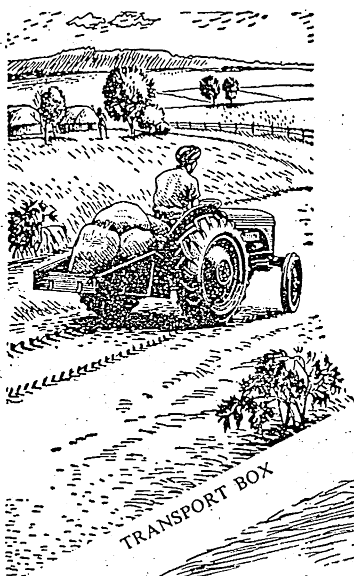

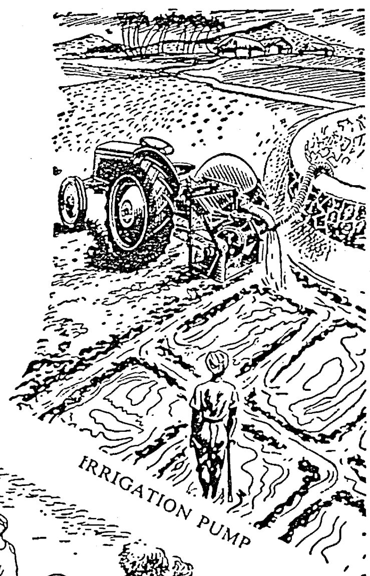

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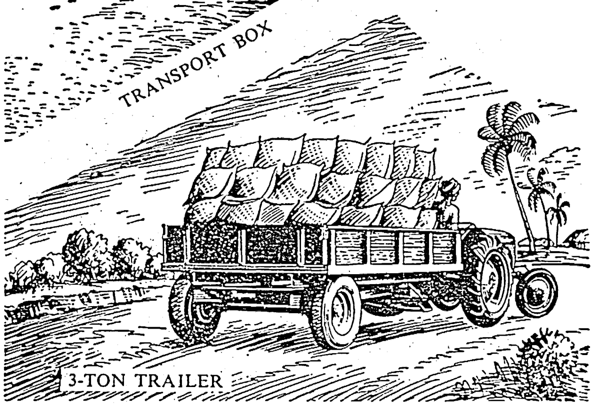

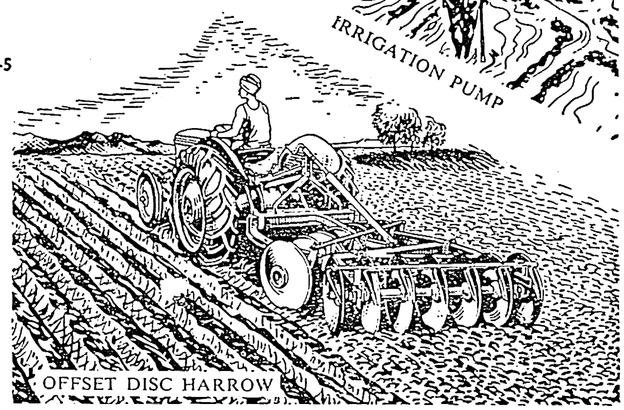

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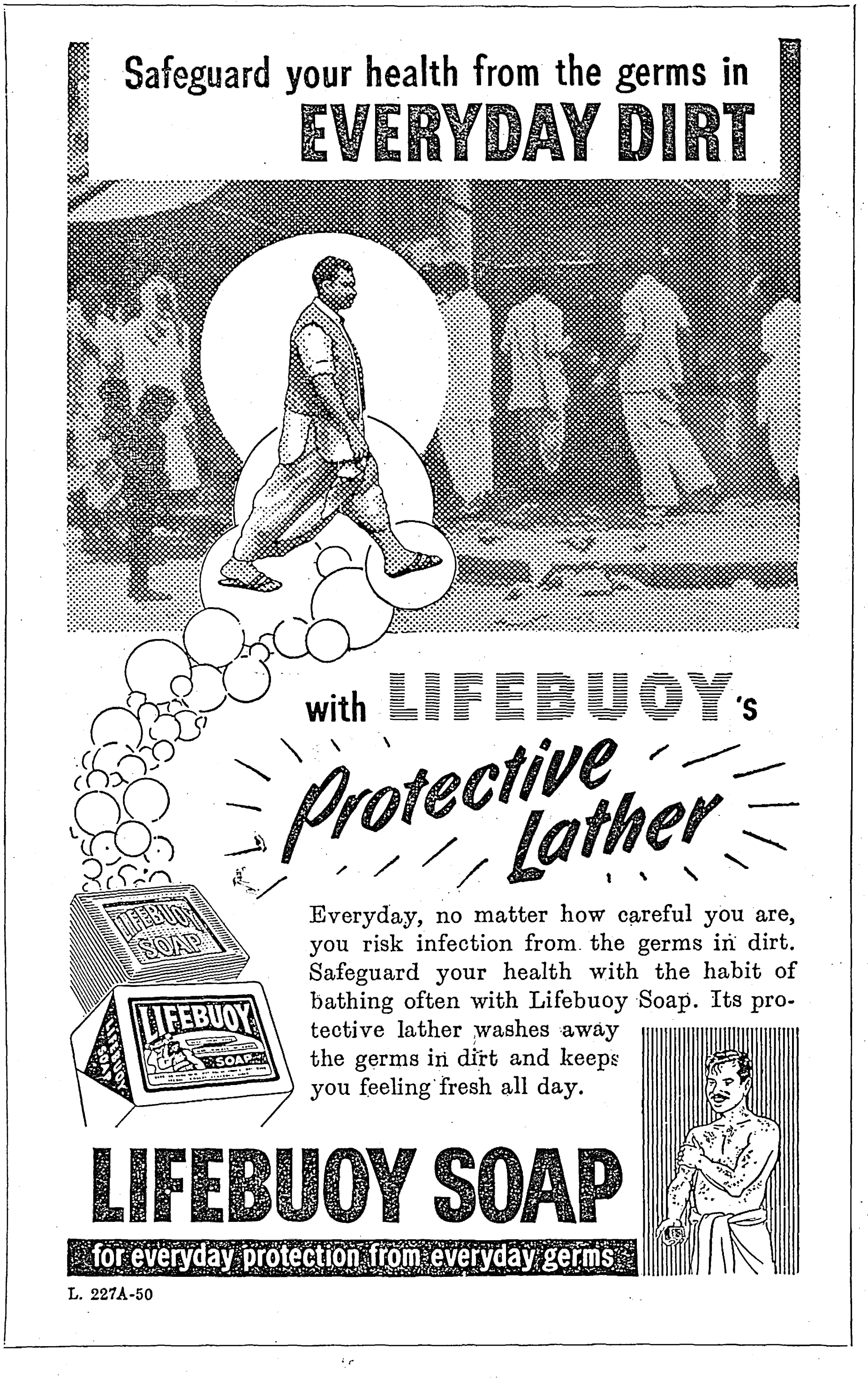

INDIAN FARMING

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PRICE 12 ANNAS FEBRUARY 1954 VOLUME III. NO. 11

INDIAN FARMING

Vol. III New Series No. 11 Feb. 1954

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Printed and published by P. H. Raman at the Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7.
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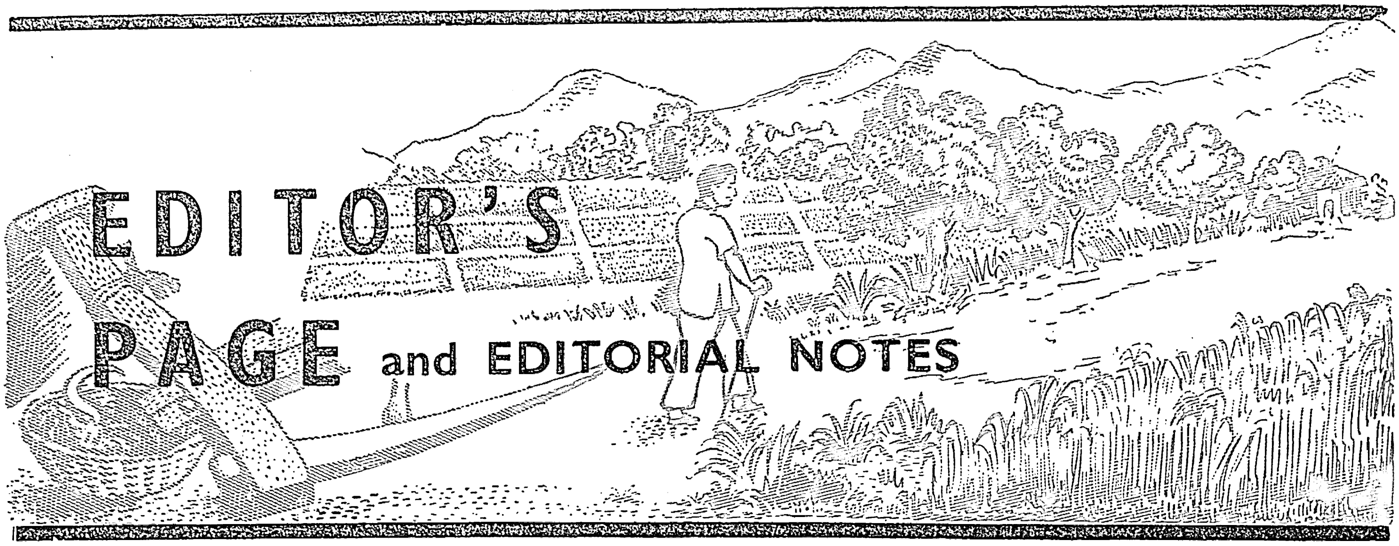


JAPANESE METHOD—A RETROSPECT

In March 1953 the Ministry of Food and Agriculture undertook to promote a countrywide campaign for the adoption of better cultivation practices in respect of paddy crop to be grown in the *kharif* season of 1953. The main purpose of this campaign was to bring home to the farmer the essential cultural practices involved in the Japanese method of cultivation of this important foodgrain. In brief the various steps are : preparation of a raised seed-bed, selection of the right type of seeds, lesser seed rate, line-sowing at the time of transplanting, proper interculturing, etc.

In fact the so-called Japanese method is nothing more than a sane and scientific way of cultivating paddy. There is hardly any step in this method which was not already known to the agricultural scientists in this country. What was probably lacking was an effort to impress on the farmer the benefits that he would derive by adoption of this method. To win over the farmer to follow the cultural practices comprising this method was, therefore, the problem which had to be faced.

The first prerequisite was the preparation of informative material relating to this method of cultivation and creating the proper mental climate among the farmers for the adoption of this method. The publicity material for this purpose was so planned and prepared that both the personnel connected with the promotion of this campaign as well as the farmers could understand the technique and follow the instructions given. The first campaign material was produced in English and Hindi. These were later translated into the major regional languages with such minor modifications as were found necessary to adjust the recommendations to the different agro-climatic areas of the country.

The publicity material did not consist of printed material only. The help of other audio-visual aids as well as demonstrations was taken recourse to. Such, for instance, were the film-strips, flannelgraphs which explained the story of the new method of rice cultivation and the benefit that would accrue to the farmer by its adoption in the shape of increased yield. Special efforts were made to ensure that the publicity material was brought to the notice of those for whose benefit it was made.

In addition to what has been indicated above, various other measures were adopted to induce the cultivator to take to this method of cultivation. Such, for instance, were granting short-term loans to the farmers and the reduction in price of fertilizers.

Reports from various sources indicate that the efforts made by the Central and the State Governments to introduce better paddy cultivation all over the country had met with success. This could be ensured from the statements from various sources, viz, from the individual farmers, reports of the State Governments, from data relating to fertilizers despatch and consumption, etc. From the reports it has been ascertained that a total of 2,06,175 acres in 25 different States have been put under the new method of cultivation. All the different steps pertaining to the new method of cultivation have been followed in these acres. In addition, the method has been partially adopted, particularly in the application of fertilizers, over an additional 30 lakh acres. In 23 States a total of 14,366 acres of seed-bed was reported. As compared with the acreage under the improved method, the seedling area appears to bear a very close approximation of the actual field area which could possibly be transplanted with the seedlings produced.

It will be at this stage appropriate to examine the various factors that went into making this campaign a success. The main factor was the conviction

carried to the farmer about the usefulness of the new method. This conviction was carried to his very door and he had not to grope about for facts and techniques. As a consequence, other factors became naturally operative. The farmers were initiated into the practice of using greater amount of fertilizers and manures with the result that these brought them good dividend. The use of good quality seeds was also an important step. The fact was impressed upon the cultivator that the better quality of seed would go a long way to give him a better crop. In addition to better seeds, a lower seed rate per acre was stressed. This had an advantage over the older orthodox method in which the farmer had to use larger quantity of seed. In many cases the operations were combined with certain types of improved implements which facilitated work. Lastly, the proper care of the seedlings in the nursery stage and proper interculturing and weeding of the plants in the field were of great importance. In short greater attention was given to the individual plants in this method, and the labour thus bestowed gave adequate return in the shape of greater yields.

Throughout the time the campaign was under contemplation, and later when it was actually conducted, the time factor was kept constantly in mind. By the time the decision was taken to work on the campaign, the sowing season was hardly a few months ahead, and steps had to be taken speedily enough to ensure that the instructions and the practices advocated reached the farmer well in advance of the sowing season. For this purpose, it was necessary that agreed recommendations were to be made ready before the advent of the sowing season and this was done. Then there was the question of organising the supply lines so as to ensure that all the materials required were made easily available. Thus, for instance, the availability of fertilizers, seeds, etc. was arranged for much ahead of time. In planning the campaign a dead line was drawn by which time the campaign material was proposed to be in the hands of the workers. This was necessary because if the workers were not adequately fed with literature and other visual aids, the campaign would have a lame start. This dead line was strictly adhered to and it was ensured that all the necessary campaign material was in the hands of the workers when they required it. And not of any less importance was the support of the leaders of rural areas, of village school masters, of public workers, etc. which was sought and readily given. Since it was a campaign meant for the people, it was essential that people's cooperation should be sought and ensured.

The data relating to fertilizer consumption make interesting reading. The reports indicate that for the period ending the 30th September, 1953, 2,12,754 tons of ammonium sulphate were consumed as against 1,89,172 in 1952. It should be mentioned in this connection that the data relating to 1953 cover a period

(*Contd. on page 32*)

(OUR COVER)

A paddy field in Bengal—the stalks being cut for separating the grains

Mr. N. C. Joseph

MEN OF THE MONTH:

Personal Car

POULTRY-

By
HARKIRAT SINGH

This fine pair of Rhode Island Red variety has been bred by Mr. Joseph

Mr. Joseph proudly displays his crop of eggs

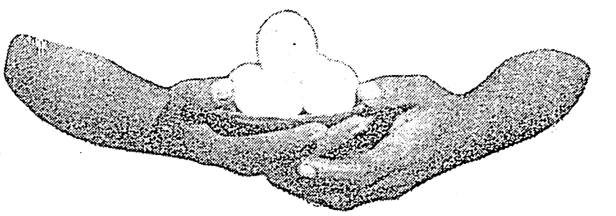
IT was an extremely pleasant experience to meet Mr. N. C. Joseph, an enlightened poultry-keeper of Ajmer. Mr. Joseph is a veteran in poultry-keeping and has developed it into an art. Poultry-keeping as a hobby would perhaps be regarded by most people as a waste of time and money, but Mr. Joseph is vehement in asserting that it is a profitable pastime, if intelligently pursued. "Besides giving certain extra income in these days of economic stress," he added, "plenty of excellent nutritive food is ensured to the keeper and his family; even the droppings of poultry are useful as manure for kitchen gardens." The observations made by Mr. Joseph are based on experience and his talk on the subject of poultry-keeping is frequently interspersed with interesting anecdotes from his long career of over 40 years in this line.

HOW IT ALL STARTED

Mr. Joseph was initiated into poultry-keeping by his mother when he was only eight years old. She being a keen and enthusiastic poultry-keeper herself wanted Joseph to learn the secrets of this art at an early age. So she entrusted all her birds to the care of young Joseph. He did not betray the confidence placed in him by his mother and gave her a surprise

Essential in
KEEPING

The prize-winning Rhode Island Red belonging to Mr. Johnson

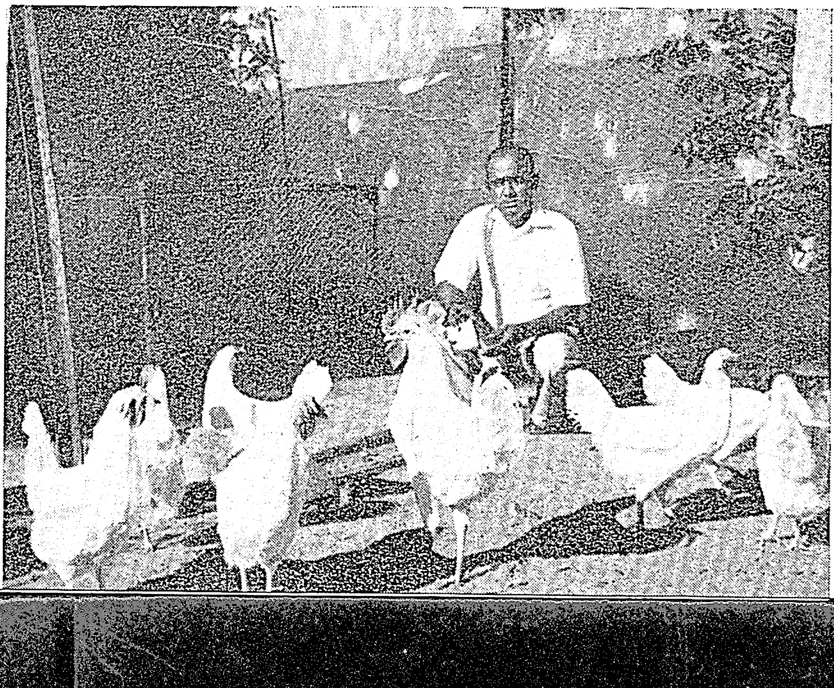


A few eggs produced by hens raised by Mr. Johnson

by winning a second prize in one of the local poultry shows held at Ajmer. The stimulus thus gained was sufficient and his interest in poultry gradually increased. He now cherished a dream to rear a flock of quality and class birds as his own.

The keen and healthy rivalry prevailing among the poultry-keepers of Ajmer at that time provided the necessary atmosphere for the development of Mr. Joseph's ideas. When he joined the railway department, with his first pay he went in for a set of eggs of White Orpington. Fortunately, from the chickens hatched out of this set, Joseph won a prize for the best bird at a local show, beating nearly all the imported stock in Ajmer. Thereafter, Mr. Joseph became a member of the Indian Poultry Club and started exhibiting his birds in the All-India Poultry Shows held at various places of India. "And wherever I exhibited my birds, I never let down my province and won a series of prizes," he said, with eyes radiating pride.

Johnson spreading clean sand in the spacious cages maintained by him



Before going to office Johnson ensures that his birds are well-fed for the day

SECRET OF SUCCESS

All this, of course, was introductory to what I really wanted from Mr. Joseph. I was interested in how he managed to make capital out of this hazardous hobby. He was amused at my enquiry and jocularly remarked that he did not possess any magic wand. The only thing that he did was that he observed all the simple rules of poultry-keeping very strictly. "To devote personal attention and care to all possible extent was the best way to raise quality birds"—this was the golden rule he followed.

Mr. Joseph believes in giving the chickens a good start. For the first three months he feeds them on skim milk, cereal grains of good quality and hoppers filled with mash. To give a good exercise to the tiny birds, he places the grains under good, clean and deep litter. As soon as the sexes can be distinguished, females are picked out from the flock and kept separately. This is especially beneficial for the pullets who are thus saved bullying by the males.

Another important point that is often overlooked by an ordinary poultry-keeper is the necessity for drastic culling and the elimination of undesirables. Only the best birds should be maintained. Mr. Joseph has developed a novel way of detecting the sick and the sorry birds. Early in the morning, he would inspect his flock and see whether the tails of all the birds were up and erect. The ones with downcast tails would at once be segregated from the rest of the flock, and in case the symptoms were serious enough, these would be destroyed straightaway. Everyday the droppings of the birds should also be examined to ensure that the birds were not suffering from any internal worms.

To keep the birds healthy, their dwelling places must be kept scrupulously clean. They must be sufficiently roomy and airy and should be kept free of any kinds of worms or ticks. The corners of the cages should be disinfected at least once in a week with the simple treatment of kerosene oil and phenyle in the ratio of 50 : 50. Such simple measures have helped Joseph keep out the most deadly disease among poultry, the Ranikhet disease, all through his long career as a poultry-keeper. And this is not a negligible achievement.

Each night Mr. Joseph would visit the cages to see that the crop is full. It should also be ensured that the birds were not losing weight. In sleeping birds breathing should not be accompanied by any sound. The last feed of the day should also be considered very important. This should be adequate so that the birds might not suffer from night starvation.

GENERAL REMARKS

Mr. Joseph has kept nearly all the common breeds of poultry, but he has developed a special preference for the Rhode Island Red variety. It is his view that this breed is as hardy as the *desi* and is quite well suited to Indian conditions. Though Rhodes consume more feed than the other types, they are absolutely docile and provide excellently nutritive food both in respect of quality and quantity.

(*Contd. on page 29*)


Quick - Lathering Sunlight
washes WHITE and BRIGHT without beating
"Teacher says I'm a smart girl. That's because mother washes my frocks sparkling white with Sunlight Soap. Those heaped-up creamy Sunlight suds chase the dirt out—quickly, easily, without beating."
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SUNLIGHT SOAP
saves clothes saves labour saves money
SUNLIGHT SOAP

S. 219-X52

SEASONAL PESTS OF CROPS: THE MUSTARD APHI[D]

By
E. S. NARAYANAN,
Head of the Division of Entomology, I. A. R. I., New Delhi

THE aphids, popularly known as the plant lice, belong to a well defined group of insects with soft bodies and piercing mouth parts with a complex and almost fascinating life-history and a staggering rate of reproduction. These aphids may be of various colours like green, grey, brown, red, black and white. They sometimes secrete long, white threads that give them a wooly appearance and lie beneath them. In other cases they secrete a sort of dust or bloom. Most of them, however, have no covering and are naked. The mustard aphid, *Rhopalosiphum pseudobrassicae* is an important member of this exclusive group and is a serious pest of this valuable oilseed crop throughout the Indian Union. They pierce the plants and suck their life-giving sap and thus devastate crops. A few years ago the mustard crops of both Uttar Pradesh and Bihar were ruined in this manner.

Though the pest is called the mustard aphid, it is a serious pest of all cruciferous crops grown in the cold weather in our country. It is, however, a major pest of mustard and rape. To the cultivators of the Punjab it is known as *tela* while in the Uttar Pradesh it is known as *maun* or *mahun*. The species is widely distributed and has been reported from almost all parts of the world. Apart from mustard and rape, its choicest food plants, it has been recorded to infest and cause appreciable damage to radish, spinach, turnip, knol-kohl, cabbage, cauliflower, lettuce and other crop plants and wild shrubs of the brassica family that grow in the cold weather. In Delhi the pest has also been recorded on tobacco and potato.

The mustard aphid is a tiny, soft-bodied insect about one-tenth of an inch long and whitish green in colour. It appears in the field sometime in November or early December depending on the weather conditions when the mustard plants have put forth their stems. Even the tender plants are sometimes literally covered with hundreds of thousands of these little villains. The affected leaves usually get curled and if the infestation is severe the plants wilt and wither. It is not unusual to find in the fields many plants in a dwarfed condition or having a stunted growth. The more heavily infested plants rot and perish. These aphids secrete a sweet liquid known as the 'honey dew' which is eagerly sought by certain species of ants that return their gratitude to their generous host by almost forming a first line of their defence. These ants sometimes even provide the aphids with adequate shelters. Apart from the ants bees, wasps and other flies are regular visitors to get their share of this sweet liquid. A black mould develops on a badly infested plant and in such cases the crop gets a black, blighted appearance.

LIFE-HISTORY OF THE PEST

Although the mustard aphid is a major pest of cruciferous crops in our country, there is still a gap in our knowledge of its complex life-history. The climatic conditions prevailing at any place at any time govern vitally the bionomics, biology and the rate of multiplication of the pest in the field. The mode of oviposition, the formation of wings in adults and the prevalence of both sexes are governed solely by the ecological factors. In temperate climate we usually get a brood just before the winter comprising of both males and females, the latter producing fertilized eggs which hibernate during the cold weather and hatch during the spring. The adults that are produced comprise both winged and wingless forms. In spring and summer, however, the aphids produce young ones without fertilization and the progeny are invariably female.

This general outline of life-history does not apply to the Indian aphids, at least those that occur in the plains. There are some forms that are active only in the winter months while others are present throughout the year if food is available. So far as the mustard aphid is concerned it makes its first appearance, as has been mentioned before, sometime in November and is observed causing extensive damage to various cruciferous crops upto April. The damage starts with mustard subsequently spreading over to radish, cabbage, knol-khol, etc. No sexual forms have so far been recorded in Delhi and the surrounding areas. Agamic or asexual production is the rule. The same has been observed in Mysore and other places in the south. It is just possible that in the hilly tracts of the Indian Union, specially in the north, where there is a severe cold weather with frost and snow, this species appears in sexual forms and lays eggs also. In the plains, however, they multiply asexually generation after generation. The first females that appear on the crop, and which are known as the stem-mothers, produce tiny living young ones which mature within a week or so and produce again other young ones. These multiply generation after generation in geometrical progression until their huge population becomes deadly to the crops.

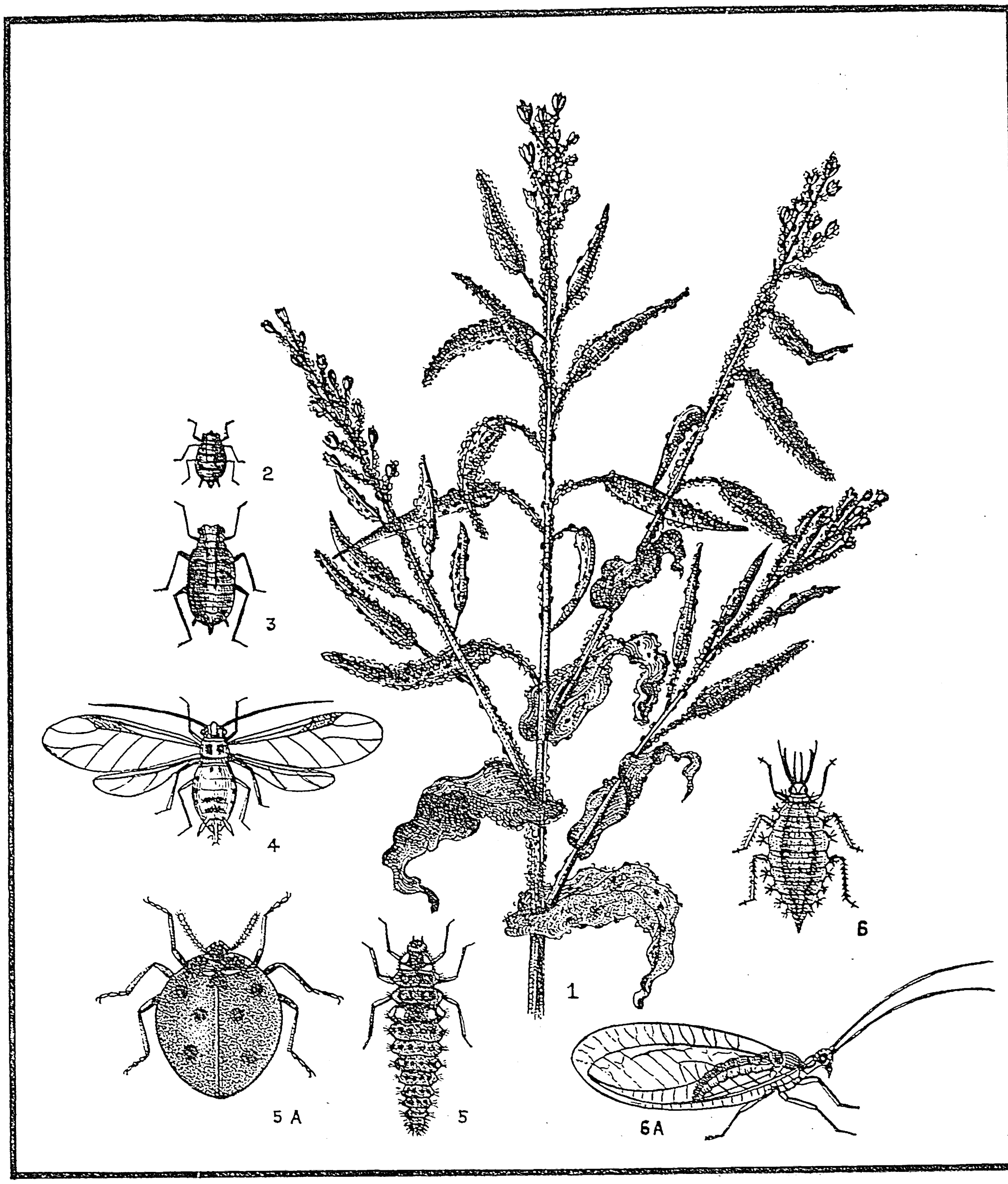
When the mustard is harvested, they turn to radish, cauliflower, cabbage or any other cruciferous crop that is left in the field. Their number goes on decreasing and as the temperature rises, the days get longer and the summer approaches, a generation of winged adults is produced that establishes small colonies on plants growing in cold moist places. Sometimes these winged adults migrate to hills

(*Contd. on page 23*)

Rhopalosiphum pseudobrassicae (DAVIS)

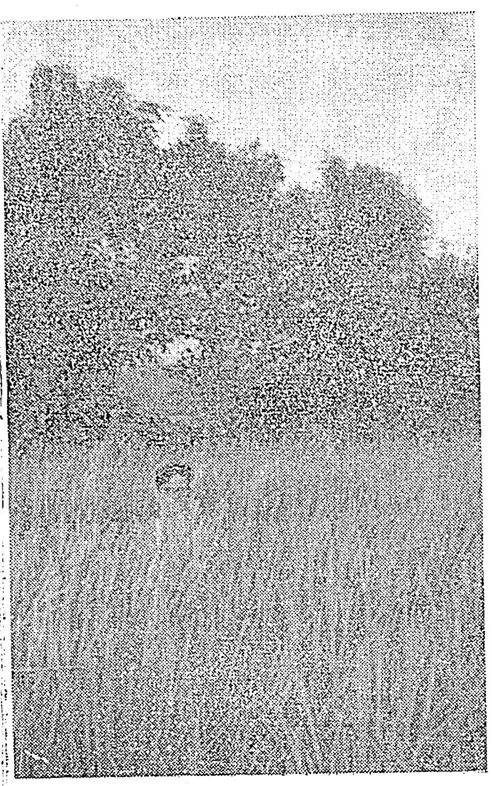
THE MUSTARD APHID "RHOPALOSIPHUM PSEUDOBRASSICAE" (DAVIS)

1. A mustard plant showing the infestation by the pest
2. Young nymph
3. Grown-up nymph
4. Winged adult
5 & 5A. The predator lady-bird beetle—grub and adult stages
6 & 6A. The grub and adult stages of the predator 'Chrysopa' sp.



New Paddy Production

INCREASED ACREAGE AND



Section of a field under the improved method of paddy growing

By

A. R. VYAS

FROM ten acres of land which were under the Japanese method of paddy cultivation, during the last *kharif* season in the Kolaba district of Bombay State, the area during the current *kharif* has increased to 400 acres; the yield on one farm which I visited last September has more than doubled. The average has increased from about 30 maunds of paddy to the acre to about 80 to 100 maunds. The wisdom of the improved method has caught the imagination of the farmers of Alibag in the Kolaba district.

METHOD PROVES POPULAR

The credit for popularizing the improved technique goes both to the major political party in the district and the agricultural officials. The first mobilized all its efforts to carry the knowledge to the fields of individual cultivators; the officers of the agricultural department provided farmers with the technical 'know-how' and fertilizers in time.

The crop which stands over six feet high has been protected against 'lodging' by coir ropes

Technique Proves Popular

IELD IN KOLABA DISTRICT

Nearly 590 farmers have grown paddy this year under the guidance of agricultural officers, each of whom looks after 10 acres; more than 250 cultivators have started on the improved method after seeing the results on their neighbours' fields. The seed rate, I was told on good authority, has come down from 40 - 80 lb. an acre, to between 10 and 15 lb. Next season it will have dropped to 10 lb.

MHATRE'S 18 ACRES

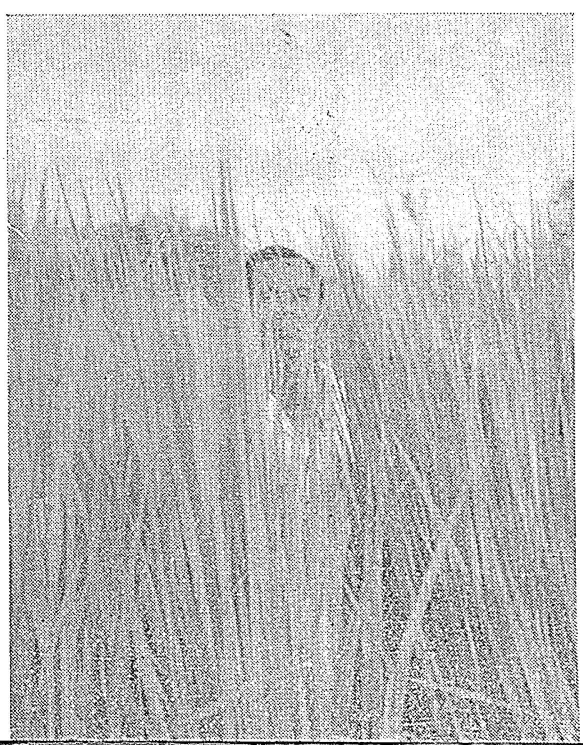
Shri N. K. Mhatre of village Dhokowda in Alibag, Kolaba district, has grown 18 acres of paddy under the improved method. His crop which had begun flowering when I saw it, stood about six feet high. Cheek by jowl was another field which had followed the old technique. The thin crop was barely three feet high, with very few tillers. Each of Mhatre's plants had more than 40 tillers as against an average of 20.

The area gets an average rainfall of 100 in. a year. The excellent condition of the crop is, therefore, the result of heavy manuring, transplantation from the raised seed-bed and interculturing.

The seed sown was of the K42 variety and manuring was done at the rate of 64 lb. of nitrogen and 32 lb. of phosphates to the acre. This farmer is, however, experimenting with different types of manure in different plots. In one area, he has used fish-manure, in another manure of sheep droppings, and different combinations of manure in yet another plot.

Translantation of seedlings was carried out in the first week of July and there have been four interculturings. The crop was harvested towards the end of October. The yield in one of the farms was between 80 to 100 maunds to the acre, as against less than half this quantity last year, when the old method was used.

Each plant has over 40 tillers as against the average of 20 under the old method of paddy growing



This gives an idea of the shape and healthy growth of the crop

Hand Rotary Hoe

By
N. GOPALKRISHNA,
College of Agriculture, Poona

WITH the adoption of the Japanese method of paddy cultivation in the country, the use of small implements for performing the various operations involved has become necessary. The Agricultural Research Station, Karjat (Bombay) in this connection has developed a simple hand-hoe, popularly known as the Karjat hoe, which may be used for interculturing. This cheap and efficient implement was well received in Bombay State. A large number of this type of hand hoes has since been manufactured in the workshop of the Agricultural Engineer, Bombay State, and supplied to interested persons in other States as well.

Manually-operated weeders of the Japanese type are available in the market but these are rather costly and are beyond the buying capacity of an average Indian cultivator. To overcome this disadvantage, a small manually-operated rotary hoe has recently been perfected at the Agricultural Research Station at Karjat for the benefit of the farmers. This hoe is an improvement over the Karjat hand-hoe and is also suitable for interculturing in wet paddy lands. The backward motion and the pressure required for working the Karjat hand-hoe have been eliminated in this improved type and it performs all the operations of interculturing at one stroke, viz. cutting of weeds, mixing these with slush and thoroughly aerating the soil by its rotary action. It is very economical to use, working four to five times faster than the Karjat hoe. It is simple in construction, light in weight and easy to operate even by a layman. With this hoe a worker can normally interculture $1\frac{1}{2}$ to 2 acres a day with ease and without much strain.

Enquiries regarding the Hand Rotary Hoe may please be addressed to the Agricultural Engineer to the Government of Bombay, College of Agriculture, Poona-5.

AGRICULTURAL EXTENSION WORK IN THE UNITED STATES

By

K. S. YAWALKAR and C. H. PATHAK

THE United States of America possesses an extensive, well-planned agricultural Extension service, which has remarkable work to its credit. Extension work in America is based on the partnership between the government, the land-grant colleges and the people. Its fundamental objective is to better the living standards of the people. This improvement is sought to be brought about by translating the results of scientific research into everyday practical usage to be followed by farmers, housewives or a community or by the whole village. Stated in brief form by Brunner and Smith, some concrete objectives of agricultural, home economics and 4-H Extension in the United States are:—

(1) To bring the farmer the knowledge and help that will enable him to farm still more efficiently and to increase his income,

(2) to encourage the farmer to grow his own food, set a good table, and live well,

(3) to help the members of the farm family to a large appreciation of the opportunities, the beauties, and the privileges of country life, and to know something about the world in which they live,

(4) to train youth to take his place as a member of the family, community and society,

(5) to promote the social, cultural, recreational, intellectual and spiritual life of rural people,

(6) to place opportunity before rural people whereby they may develop all their native talents through work, recreation, social life and leadership, and

(7) to build a rural citizenry, proud of its occupation, independent in its thinking, constructive in its outlook, capable, efficient, self-reliant, with a love of home and country in its heart.

Thus Extension not only takes the findings of science to the farmers and assists them in stepping up production, but it also takes the problems of the farmers to the research laboratories for investigation. Thus Extension may be thought of as a two-way channel—extending, on the one hand, the findings of science to the farm people, and, on the other, taking the problems of the farmers to the research workers for study and analysis.

The development of this programme on such a large scale is not without a philosophy.

According to O. B. Martin, there are four great principles upon which the Extension Service proceeds, namely,

(1) The citizen is the sovereign in a democracy,

(2) the home is the fundamental unit of civilization,

(3) the family is the first training group of the human race, and

(4) the average farm is endowed with great resources and possibilities.

Professor M. L. Mosher (University of Illinois) has given a five-point outline for agricultural progress:

(1) *Research*—that learns the facts on which a sound agriculture is based

(2) *Education*—of many farm people in the facts learned through research

(3) *Application*—to farm practice, in an organized way, of the facts of research learned through education

(4) *Selection*—of the most valuable products or practices found by measuring the results, when established facts are applied by many farm people

(5) *Distribution*—to all the farm people of the most valuable products or practices developed by the application of the facts of research, tempered by farm experience

The Extension work in the United States, undoubtedly, will always remain a model for countries thinking of introducing such a system at home. Here, however, a word of caution may be added. The United States has followed a unique course of development. The United States Extension Service had its beginning under exceptionally favourable circumstances. One should not, therefore, be dazed by the colossal Extension organisation functioning in that country. Local conditions have to be carefully considered before launching any such scheme.

RABIES

By
S. P. BERI, Animal Husbandry Department, Ajmer

RABIES is an acute and rapidly fatal disease, principally affecting canines. It is also communicable to man by the affected animal biting him. The most characteristic symptom of the disease in human beings is a great dread of water. Due to this reason, rabies is termed hydrophobia, meaning 'fear of water', when it affects human beings. This term, however, is not applicable to animals, since 'fear of water' is not a symptom in them.

This disease is found in most of the countries of the world. It has been practically stamped out from the British Isles, due to the effective enforcement of measures like six months' quarantine of all imported dogs, destruction of all stray dogs and such other precautions.

The infective agent is a virus which cannot be seen by ordinary microscopes. This is present in the saliva of rabid animals and is introduced into the tissues through a wound usually inflicted by the teeth of affected animals. The infection can occur through any wound soiled with infective saliva. The infection travels up to the brain through the nerves.

DANGEROUS DISEASE

Even though the total number of domestic animals dying of this disease every year in India may be comparatively smaller than of other diseases like rinderpest, yet rabies remains one of the most serious and dreadful diseases due to the following main reasons:

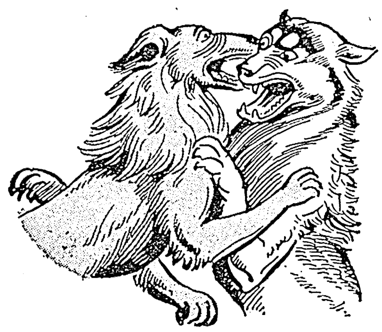
(i) Death is sure once the animal starts showing symptoms of the disease

(ii) Man can also be infected by the animals

SOURCE OF INFECTION

Though almost all species of animals are susceptible to rabies, the dog remains the main source of infection in our country. According to Ahuja and Brooks, out of the 44,869 human cases in 1949 which got anti-rabic vaccine, prepared at the Central Research Institute, Kasauli, dogs were responsible for 89.2 per cent and jackals for 6.8 per cent of the bites. In addition to dogs, jackals and wolves, rabies has been reported in India in such animals as cattle, the horse, mule, camel, cat, monkey, mongoose, hyena, tiger, panther and the elephant.

Mice, rats and monkeys are readily susceptible to rabies when artificially infected for experimental purposes but in nature, these



animals rarely suffer from rabies. No case of hydrophobia has been recorded in India as a result of a rat-bite or monkey-bite.

SYMPTOMS

Symptoms in animals which are in the main responsible for the infection of the disease in India, in some domesticated animals and man are briefly given below:

Dogs: In dogs, the disease takes either a furious or a dumb form. There is no fundamental difference between the two forms, except that in the furious form the period of excitement is more pronounced as compared to the dumb form. The constant and common feature of both the forms is that the animal ends in paralysis followed by death within five days. In the furious form the symptoms may start with excitement, manifested by wandering over long distances in the case of pariah dogs and hiding in dark places in the house, accompanied by excessive friendliness towards the owner in the case of pet dogs. The animal starts attacking living or imaginary things without provocation. The voice becomes altered in character. In pet dogs, biting its own chain and such other objects is a common feature. An affected pariah dog, while running long distances may aimlessly bite any one coming in its way, but will not chase or make any special effort to bite a dog or other animal going away from it.

In the dumb form of rabies, the excitement period being less marked and shorter, the symptoms seen are paralysis of the lower jaw, protrusion of the tongue and salivation. In both the forms, the primary symptoms are followed by paralysis of the hind legs before death.

Jackals: Jackals usually run away on seeing human beings. If a jackal attacks a human being, it should be presumed to be rabid.

Cattle, sheep and goats: Cattle manifest signs of fury by frequent striking of feet on the ground, bellowing and a general disposition to do damage. There is dribbling of saliva from the mouth. These symptoms are followed by paralysis commencing with the hind limbs. Symptoms of rabies in sheep and goats are very much similar to cattle. These animals generally do not bite other objects.

Horses: In horses, the stage of irritation is generally well-marked. They may bite themselves and other objects like the manger. Symptoms of excitement are followed by paralysis affecting the throat muscles and hind limbs.

Human beings: The symptoms usually start with depression, anxiety or fear accompanied by pain at the site of the bite. There is a slight rise in temperature. There is a disinclination to drink liquids, especially water, and when the patient tries to drink water there is a sudden spasm of the throat muscles, with the result that the patient feels choked and may emit peculiar sounds while struggling to take his breath. At this stage, diagnosis is not very difficult and specially so when there have been reports of dog bites. This stage gradually passes into exhaustion and general paralysis. which soon ends in death.

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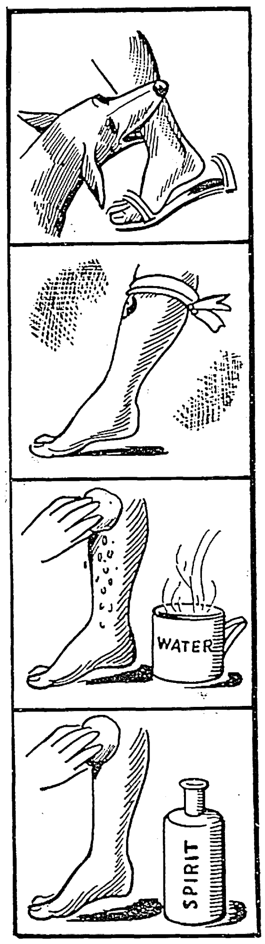
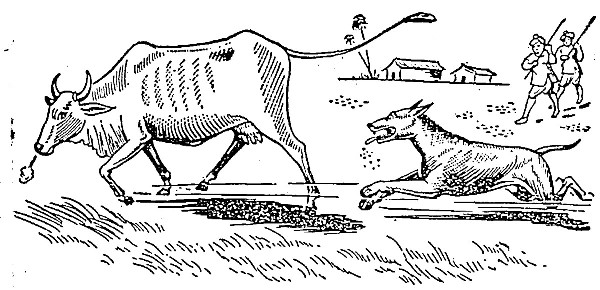
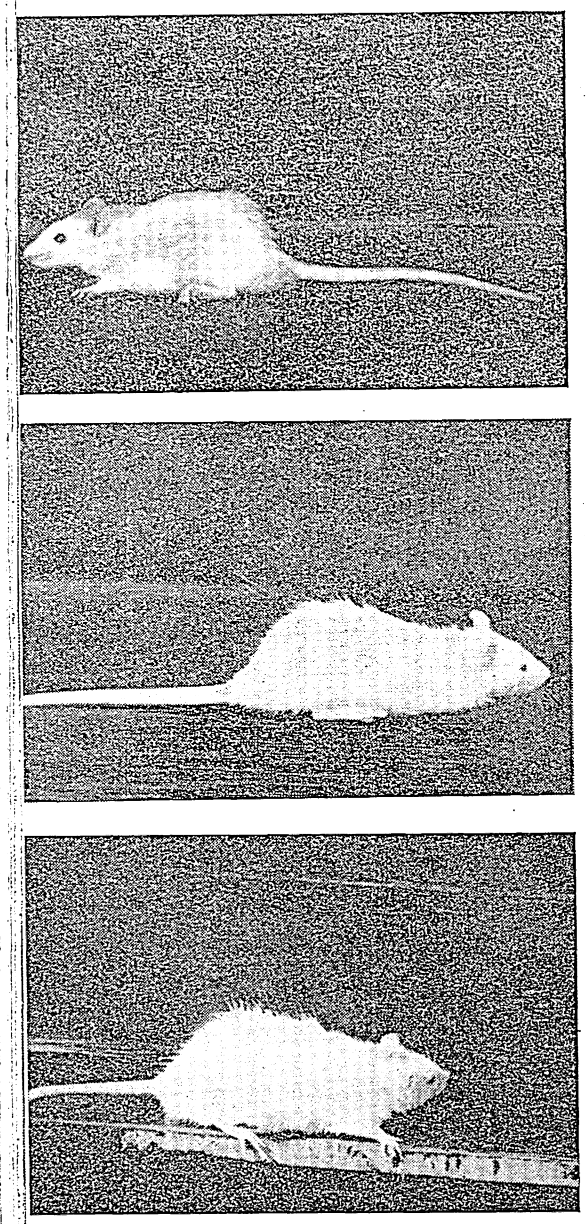




Food value of GHEE, VANASPATI AN

By N. D. KEHAR, Animal Nutrition Division, Indian Veterinary Research Institute, Izatnagar



A

B

C

In the 1st generation no difference in growth is observed between (a) "ghee" (b) "vanaspati" and (c) oil groups

FAT is an essential constituent of human dietary. It acts and only as a source of energy but also as a supplier of essential fatty acids and a carrier of fat-soluble vitamins, namely, A, D and E.

CLASSIFICATION OF DIETARY FATS

The dietary fats can be classified into two broad groups, viz., (1) those of animal origin, like butter, lard, etc. and (2) those of vegetable origin, like mustard (*Brassica nigra*), *til* (*Sesamum indicum*), groundnut (*Arachis hypogea*) and coconut (*Cocos nucifera*) oils, etc. Chemically these materials are similar, being compounds of glycerine with certain types of organic acids. The oils which are liquid at ordinary temperature can be hardened by hydrogenation—adding hydrogen with the help of a catalyst which aids this process. This hydrogenated product is popularly known as *vanaspati*.

The average Indian generally prefers *ghee* (clarified, heated butter) to oil or other types of fat. During and after the Second World War, most of the articles of human consumption including *ghee* were in short supply. The shortage of *ghee* was at one time considered to be approximately 400 per cent. The extremely high prices of *ghee* made it unavailable to the common man and various kinds of *vanaspatis* became popular in the early forties as they resembled *ghee* in appearance and were comparatively cheaper.

FOOD VALUE OF 'VANASPATI'

There is much controversy about the nutritive value of *ghee* as compared to that of vegetable oils, both in the natural as well as in the hydrogenated forms. This controversy is prevalent among research workers both in India and other countries. In view of the divergent opinions held by scientific workers, on the nutritive value of different fats and oils, and also because of the use of such terms as vegetable *ghee* as synonyms for *vanaspati*, it was considered worth while to undertake a study of the nutritive values of the latter as compared to those of the former.

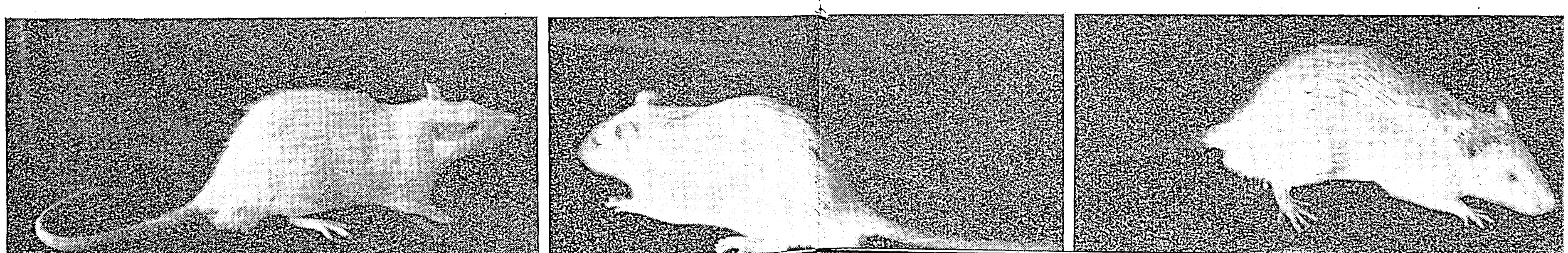
Appreciating the immense importance of this problem, investigations were undertaken to determine the nutritive values of raw and refined mustard, *til*, *mohua*, (*Bassia latifolia*), coconut, cottonseed (*Gossipyum sp.*) and groundnut oils commonly used for edible purposes in different parts of the country, and eight brands of *vanaspati*, viz. Dalda, Swastika, Kotogem, Temple, Rajhans, First Quality No. 1, Binaula and Cotex. The nutritive values were compared to those of *ghee* as affecting growth, reproduction and lactation. The effects upon the absorption and utilization of vitamins (A and B), calcium, phosphorus and protein were also studied.

This work was carried out in two series with rats as experimental animals. In the first series, the fats were incorporated at a five per cent level in a synthetic diet containing sub-optimum quantities of vitamin A and possibly also of vitamin B-complex. In the second series, these fats and oils were incorporated at the same level, in some Indian dietaries of poor quality. The indices for comparison in both the series were growth, general health, as well as reproduction and lactation.

SYNTHETIC DIET EXPERIMENTS

The experimental rats were fed on a purified diet in which protein was supplied from casein, carbohydrates from starch or cane-sugar and minerals from pure salts. The diet contained sub-optimum quantities of vitamin A and possibly also of vitamin B-complex. Such a diet was selected with the specific object of simulating field conditions. This diet together with five per cent *ghee, vanaspati* or oil was fed to different but similar group of rats and the experiments were carried out for over three generations.

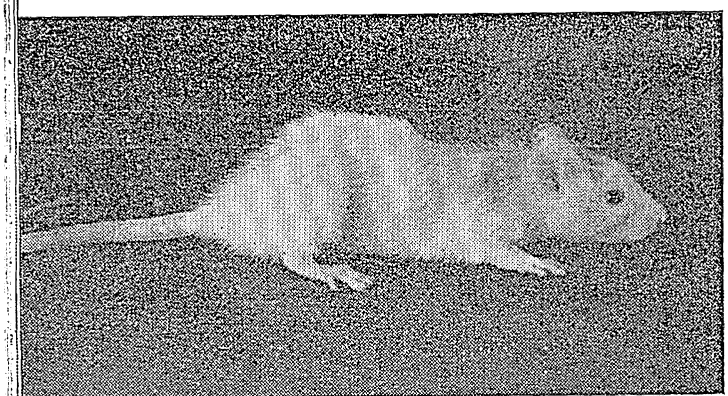
On liberal diet no difference in growth was observed between (a) "ghee" (b) "vanaspati" and (c) oil fed-rats

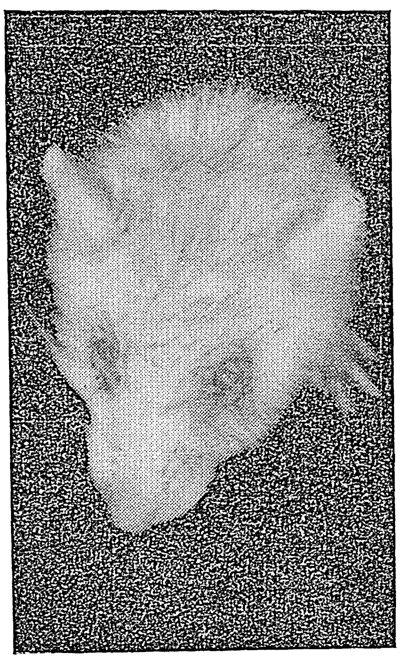


A

Normal coat in (a) cow-"ghee" group and (b) alopecia (hairlessness) in "vanaspati" groups

B





A

Rats fed on poor Bengali diet with certain "vanaspatis" for a prolonged period exhibit (a) xerophthalmiac (eye symptoms (b) paralysis

Effect on growth: It was found that in the first generation there was hardly any difference in the growth-promoting values of different fats.

In the second and subsequent generations, the rats of the cow-*ghee* groups showed, in general, a much better growth than the animals fed on *vanaspati* or raw or refined oils. Among the different oils and the various kinds of *vanaspati* themselves, there was hardly any material difference. As between oils and the various kinds of *vanaspati* there was not much to choose.

Reproduction and lactation: In regard to reproduction and lactation, no marked difference was observed between the various groups fed on various kinds of *ghee, vanaspati* or oils in the successive generations.

Liberal feeding: The oil or *vanaspati*-fed animals, which had shown poor growth on the basal ration, when given to a liberal feeding, i.e. when vitamins and other essential dietary factors were added, made rapid gains in weight and very often equalled the *ghee*-fed rats within a few weeks.

EXPERIMENTS WITH REGIONAL DIETARIES

In the second series of experiments, *ghee, vanaspati* and oils were added either to the Bengali or to the North Indian diet as used by an average man of low-income group. These experiments were confined to one generation only but were spread over a long stretch of time.

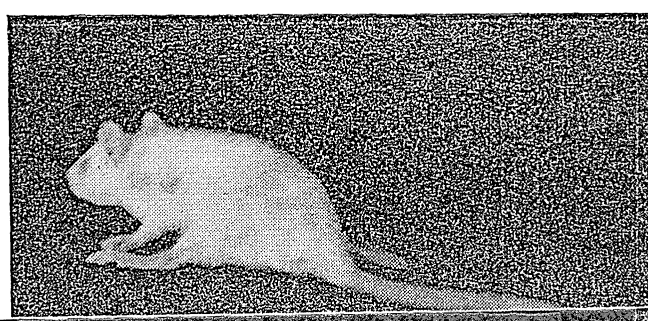
BENGALI DIET

The Bengali diet was, on analysis, found to be very poor in calcium, protein and vitamins. The effect of feeding this diet over a prolonged period gave the following results with regard to growth and general health.

Growth: On feeding the Bengali diet with either *ghee, vanaspati* or oils the growth obtained was uniformly poor and practically no difference could be observed between the various oil and fat groups.

On supplementing the diet with extra vitamins, although the gain in weight of rats, in each fat group,

B



was much higher than on the unsupplemented diet, no difference in the growth-promoting values of the various fats could be discerned.

General health: On prolonged feeding of the Bengali diet, various pathological symptoms like alopecia xerophthalmia and paralysis were seen in rats consuming *vanaspati* of certain brands. These symptoms were generally observed after the nineteenth week of feeding. Animals fed on cow-*ghee* were found to be comparatively less affected.

As *vanaspati* contains no vitamin A and *ghee* is a fairly rich source of this vitamin, it was concluded that most of these deficiency symptoms seen in the *vanaspati*-fed rats might be due to chronic vitamin A deficiency.

NORTH INDIAN DIET

In the other group the dietary tried was that of an average man in North India. This diet was, on analysis, found to be richer than the Bengali diet. On feeding this diet with cow-*ghee*, various kinds of *vanaspati*, or oils at the same level, it was observed that the group of animals fed on cow-*ghee* grew at a better rate than the littermates given the same diet containing oil or *vanaspati*.

When the diet was supplemented with extra vitamins, it was observed that the animals showed more rapid growth and the differences in the growth rates with various fats, i.e. *ghee, vanaspati* or oils disappeared.

Thus it would be seen that whereas on a sub-optimum diet cow-*ghee* proved to be the best fat, on a liberal diet, the animals receiving *ghee* or any of the other fats fared equally well. Also, on very poor diets, which are deficient in many essential nutrients, no difference between one fat and another worked with in these experiments could be observed.

SUBSIDIARY EXPERIMENTS

The above experiments indicate that with a sub-optimum diet, *ghee* appears to give better results than crude or refined oils or *vanaspati*. When, however, the animals of the oil or *vanaspati* groups are switched over to a liberal diet, the difference between the group of animals fed on cow-*ghee* and oil or *vanaspati* diminishes.

In order to find out the reasons for the superiority of the cow-*ghee* over other fats and oils, when incorporated in a sub-optimum ration, a number of subsidiary experiments were conducted to find out the digestibility of fats and oils, the comparative effects of different dietary fats on protein metabolism, calcium and phosphorus absorption, utilization of carotene and requirement of B vitamins.

The digestibility of fats and oils: Experiments carried out to study the digestibility of cow-*ghee*, buffalo-*ghee*, crude and refined mustard, *til, mohua*, coconut, cottonseed and groundnut oils and eight different brands of *vanaspati*, when fed at a five per-cent level, showed that the digestibility of all the fats and oils studied was more or less of the same order.

Calcium, phosphorus and protein metabolism: Experiments carried out to determine the utilization of calcium, phosphorus and protein, when *ghee*, oils or *vanaspati* were used in the diet, showed that some of the oils and *vanaspati* yielded results comparable to cow-*ghee* as regards the absorption of calcium, but as for phosphorus cow-*ghee* appears to give better results than any other fat.

With regard to protein, it was found that whereas all the fats and oils studied were more or less equally efficient in improving the digestibility of the ingested protein, cow-*ghee* was superior to others in raising the biological value of the protein in the diets.

VITAMIN 'A' IN 'GHEE', OILS AND 'VANASPATI'

Cow-*ghee* is a good source of vitamin A. Its yellow colour is due to the presence of carotene (a precursor of vitamin A). Buffalo-*ghee* generally does not contain carotene and its vitamin A content is usually lower than that in cow-*ghee*. *Ghee* ordinarily available in the markets generally contains a very small amount of vitamin A.

Vegetable oils were formerly reported to contain no carotene. But it has been found that cottonseed, *mohua, til*, mustard and groundnut oils contain small amounts of carotene. Refined oils or *vanaspati* do not contain vitamin A.

VITAMINS A AND B-COMPLEX

When the experimental feeding periods of rats used in different groups for studying growth rates were over, the livers of these rats were examined for their vitamin A content. It was observed that the greatest amount of vitamin A was found in the case of animals of the cow-*ghee* group.

Experiments carried out with two members of vitamin B-complex, viz. H thiamin and riboflavin showed that under identical conditions rats fed on cow-*ghee* required less of these vitamins than those fed on *vanaspati* and oils.

Refining as well as hydrogenation of oil seemed to lower the capacity of the liver to store vitamin A.

In another experiment equal amounts of carotene were fed to rats in different oils, *vanaspati* or *ghee*. It was found that the efficiency of utilization of ingested carotene, as measured by the percentage recovered as vitamin A in the liver, was better with cow-*ghee* than with either *vanaspati* or oils.

HEATING AND THE VITAMIN 'A' CONTENT OF 'GHEE'

Since *ghee* and other fats are used for cooking, observations made to determine the effect of heating on their vitamin A content showed that when *ghee* was heated to 180°C. for half an hour, 50 per cent vitamin A was destroyed. Similar observation holds good in the case of oils and *vanaspati* as well.

BUILDING UP A BETTER EWE FLOCK

By
S. JAYARAMAN and B. B. BUCH

IF the sheep maintained by our flock-owners have to bring in very good returns, proper attention should be given to ewes. At present, flock-owners tend to pay a lot more attention to the ram, with comparatively very little attention being paid to the ewes.

The ram no doubt plays an important job in the flock, but putting a high class ram in the flock and neglecting the ewe will not help in building up the productive level of the flock. What is, therefore, needed is that equal emphasis is also laid on the good management of the ewes.

Good management principles include attention to breeding, feeding and good care in general of the ewes.

In our villages, ewes are bred throughout the year, with the rams running with the ewes both day and night. Lambs are never weaned. This results in ewes starting their breeding cycle at ten and twelve months, much earlier than what is desired. The progeny as a consequence are poor, and the productive life of the ewe is also shortened. Since ewes would not have been fully grown at this breeding age, all ewes breeding before they are 15 to 18 months old will remain stunted and will be poor 'doers'.

Allowing the rams to run with the ewes all the year round has other disadvantages as well. As lambs are dropped the year round, they will not be uniform in age. A high mortality will also result in lambs dropped during periods when climatic extremes are felt. A number of ewes get conceived twice in the year and drop two crops of lambs in the same year, which will not be economical under the grazing conditions available in the country.

Male lambs, which can best be disposed of for mutton in early winter, will naturally fetch a lower price in the market as they will not be uniform in size. Returns from the wool clip are also affected owing to a lack of uniformity in the first wool clip, as it comes from lambs of varied ages. Some ewes are likely to remain empty due to the excessive strain on breeding rams.

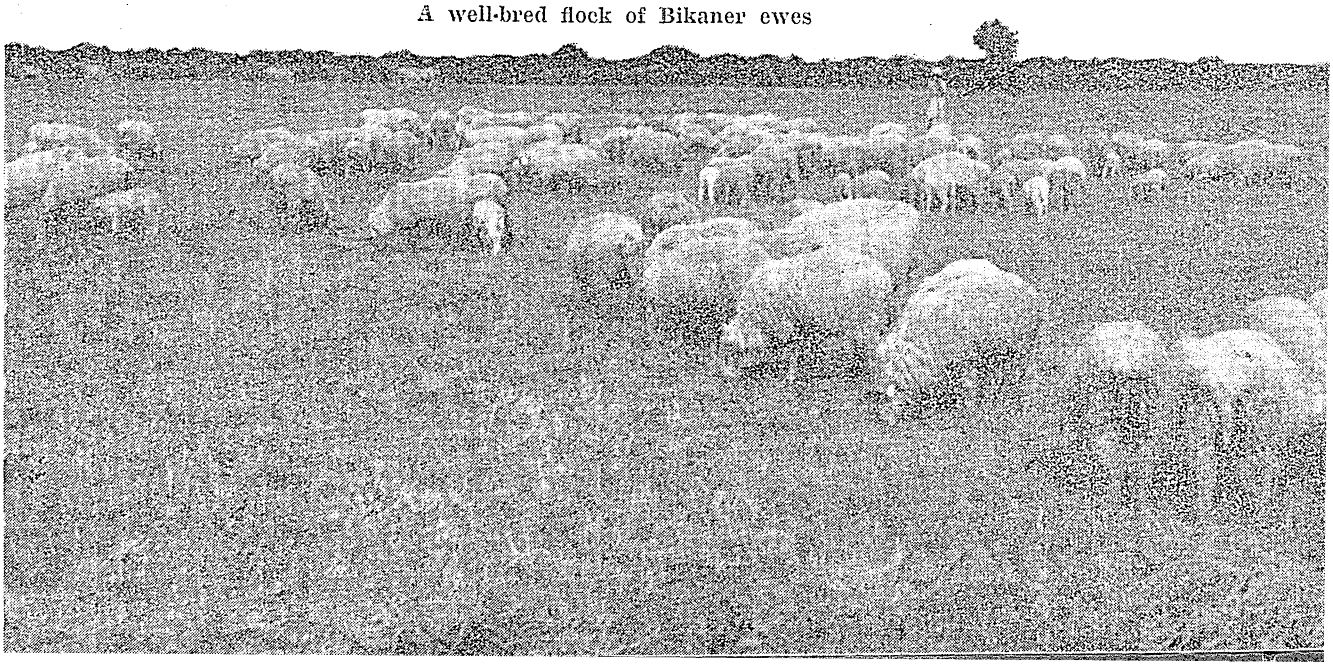
Considering these disadvantages, it is essential that the common practice of leaving rams with the ewes throughout the year should be discontinued, and a particular breeding season should be fixed for the dropping of lambs.

UNECONOMICAL SYSTEM

Experiments conducted at the Government Livestock Farm, Hissar, have proved that the practice of obtaining two crops of lambs a year retards flock improvement and such a system under Indian conditions is uneconomical. Ewes dropping lambs twice a year can never develop fully and their lambs will have their growth retarded. In the long run there will be a marked deterioration in the flock. Further, the additional feed and fodder requirements due to the extra strain cannot be fulfilled through grazing alone. Hence only one crop of lambs in a year must be aimed at.

The fixing of the breeding season will depend upon the period during which it is desired to have the lambs born. Lambing should be so adjusted that it coincides with the time when grazing is in plenty so that there may be the least strain on the ewes. Further, lambing should be at a time when the climate is also temperate. After fixing the lambing period, it is easy to adjust the mating season. This should be five months in advance of the lambing period, which is approximately the period of pregnancy in the ewes. The

A well-bred flock of Bikaner ewes



mating season should not last for more than two or three months.

THE RIGHT PLAN

The ewes should be divided into groups of 40 to 50, and each group folded in a separate pen. This facilitates systematic breeding since one ram is enough to serve all the ewes in each pen. The ram should be let in with the ewes only at night, after the ewes return from grazing and should be removed from the pen at daybreak next day. This arrangement permits the ewes to graze undisturbed during the day, at the same time allowing the rams to rest between the mating hours.

All ewes must be branded or marked for identification in the different pens to detect ewes entering a wrong pen before the ram is put in for service. It is a good policy to check up each evening whether the ewes are in their proper pens. The ram must also have a similar identification mark. If it is desired to record the date of service for the ewes, a colour paste may be applied on the ram's brisket in the evening just before putting it with the ewes. Ewes that are served during the night will be detected the next morning by the colour mark left on their rumps. In order to detect ewes that have missed a fertile service at the first service but get served again in the next heat period, a different colour may be used every 17 to 18 days. During the first ten days after the commencement of the mating season, a close watch should be kept to see that the ewes are properly served.

Pregnancy and lactation are heavy strain on the ewe. Naturally, the ewe requires a period of rest after each pregnancy and lactation. It is, therefore, absolutely necessary to wean lambs when about four months of age to allow the ewes to have a resting period before the onset of the next mating season. Weaned female lambs should be kept away from the rest of the flock until they are fit for breeding.

FEEDING THE EWES

The main income from the sheep to the farmer is derived from the sale of sheep and its products for which it is essential that they may be efficiently and adequately fed. It is, however, imperative that the feeding must be very economical with no detriment in efficient production.

During summer, flocks need good pasture, shade, salt and plenty of pure water. Salt should be available for the sheep at all times. A sheep needs about one to six quarts of water daily, depending upon the feed, weather conditions and the water-content of the forage.

It was observed at the Government Livestock Farm, Hissar, that grain-feeding of ewes throughout the year did not result in any extra returns except that the advantage of grain-feeding was apparent in the first two years of the ewe's life, after which the productive value of both the grain-fed and non-grain-fed groups was the same. Sheep, therefore, should be fed on grazing alone bearing in mind, however, that nutritious grazing should be provided. Overstocking on any piece of land, however rich in nutritious grasses, must be scrupulously avoided, as under-nutrition with its adverse effects will result. If possible, it is a good practice to divide pastures and to graze the flocks by rotation. This practice will also aid in reducing the losses due to worm infestation.

Although feeding of ewes with grain is not economical, there are occasions when grain-feeding becomes necessary and advantageous. Placing ewes on a rising plane of nutrition for a period of about two or three weeks prior to the mating season, a practice known as 'flushing', tends to increase the proportion of twin lambs and to bring all the ewes in heat nearly at the same time, resulting in a more uniform lamb crop. The following concentrate mixture will be found useful:

Gram	2 parts
Bran	1 part
Salt	1 per cent
Sterilized bone-meal	1 per cent

A $\frac{1}{4}$ to $\frac{1}{2}$ lb. of the above mixture may be fed to each ewe.

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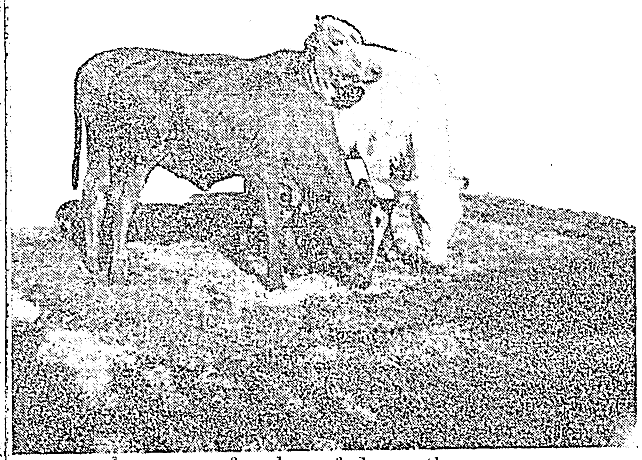

A group of calves fed on three per cent refined groundnut oil in skim milk

Feeding Dairy Cattle

By
C. P. ANANTAKRISHNAN,
Indian Dairy Research Institute, Bangalore

EVERY year, dairymen raise a large number of calves for replacements in their herds. They are fed on whole milk, and the quantity thus utilized for feeding calves alone is pretty large. For one thing it means so much less milk available for human consumption, especially so at a time of milk-shortage, and for another the dairymen have to meet the higher cost of rearing the calves as a result of feeding them with whole milk.

Butter-fat is essential for the growing calf; more so in the initial stages. But if an alternate and cheaper source of supply of butter-fat could be found for feeding calves, it would certainly reduce rearing costs and direct more milk for human consumption.

Experiments conducted at the Indian Dairy Research Institute, Bangalore, showed that cheap alternate feed could replace milk. Refined groundnut oil and hydrogenated groundnut oil, instead of milk-fat, were tried in feeding calves with good results.

Refined groundnut oil at three per cent level and hydrogenated groundnut oil at four per cent level were used in skim milk and calves fed on these were compared with those receiving three per cent and four per cent butter-fat through whole milk respectively, and the growth and general condition of the groups observed. Calves not receiving milk were given shark liver oil to supply vitamins A and D. The other feeds given was common for all the groups.

Results showed that groundnut oil at three per cent level or hydrogenated groundnut oil at four per cent level in skim milk can be a very good substitute for whole milk in raising young calves. These vegetable fats, therefore, can be used instead of whole milk, thus reducing the cost of rearing calves and making more milk available for the people.

HIGHER VITAMIN 'A' CONTENT

Another interesting result of research obtained at the Institute was the possibility of increasing vitamin A content of milk of the cow during certain months by

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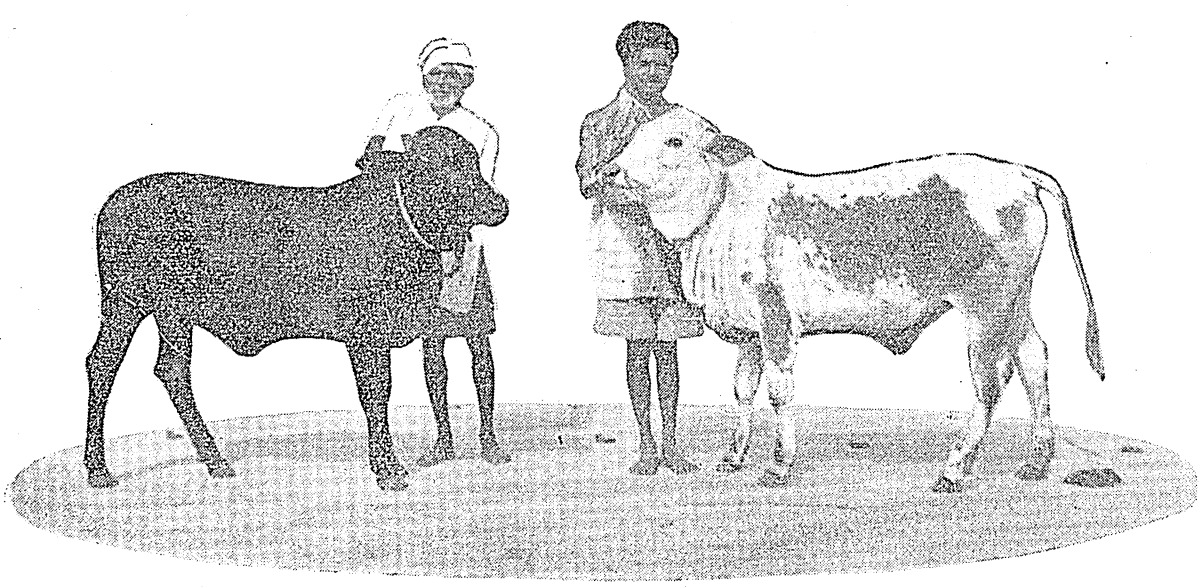


(Left) An experimental calf (four per cent hydrogenated oil); (Right) the control calf (four per cent milk-fat)

AGRICULTURE IN BOMBAY STATE

By
V. P. BHIDE

THE Bombay Government have already spent Rs. 50 crores in the last two years for the implementation of the Five Year Plan in respect of agricultural development. During 1952-53, an area of 1,17,000 acres was covered by new bunding work and 42,000 acres were covered by mechanical cultivation. The area of *khar* (salt) land reclaimed during the year was 13,500 acres. In the field of minor irrigation, 42 schemes have been implemented and seven are in progress. With the help of a loan of rupees one crore sanctioned by the Government of India for minor irrigation works 84,100 acres have been brought under irrigation already and this area will increase to 1,10,000 acres when all the projects are implemented.

Of the total area of about 31 lakh acres under paddy in the State, about 17 lakh acres are under transplanted paddy. From this area, nearly four lakh acres are suitable for the Japanese method of rice cultivation, since rainfall in this region is assured. The adoption of this method is expected to save about 400 tons of paddy seed besides increasing the crop yields considerably. Demonstrations of the Japanese method of paddy cultivation have been organised in various centres in the rice growing districts. Provision has also been made to advance *taccavi* loans to farmers for adopting this method for purchase of seed, fertilizers, etc.

Two farmers, Shri Laxman Gopal Mali of Shivre village and Shri Kallappa Barma Chougule of Ashta village won first prizes in the 1952 *Kharif* crop competition held at the State level. By adopting improved methods of cultivation and a liberal application of the compost obtained from town and rural wastes, farmers of village Bidanhal, near Hubli in Dharwar district, have increased yields of *jowar* from four to six times per acre.

Bast fibre extracted from cotton stalks by retting appear to be promising as a substitute for jute. Improved cotton varieties, viz. Virnar and Jarila yield fibre as good as jute. In experiments with irrigated Combodia-4 and non-irrigated Jarila cottons, the former gave an yield of $3\frac{1}{2}$ maunds of fibre per acre, whereas that of the latter was $1\frac{1}{2}$ maunds. The fibre, though too coarse to be spun by itself, can be mixed with jute for gunnies or made into ropes and cords.

SEASONAL PESTS OF CROPS

(*Contd. from page 8*)

from where they return to the plains when mustard crop is again in the field. It is a very common phenomenon to see the winged aphids flying about in the warm evenings in April and the beginning of May. Sometimes in our wanderings in the field at about this time our clothes are covered with these winged forms. Several overlapping generations are present during the period November to March. Cloudy and moist weather is conducive to the rapid multiplication of the pest in the plains, and when these weather conditions prevail we must always expect a widespread outbreak of the pest.

CONTROL MEASURES

But for the fact that the pest is kept under check both by physical and biological factors, the damage caused to the crops would have been far more serious than what it is today. Wind and rain and fluctuating temperatures cause appreciable mortality among the aphid population. In addition there are a good many parasites and predators that take a heavy toll of the pest. Aphids are parasitized by braconids and predated upon by the grubs and adults of lady-bird beetles, by the maggots of syrphid flies and the young ones of chrysopids and 'hemerobiids'. A fungus disease also destroys them in large numbers under favourable conditions and their characteristic way of living in large numbers and almost touching each other makes the task of the fungus all the more easy. The following control measures are recommended to bring down the pest population effectively in the field:

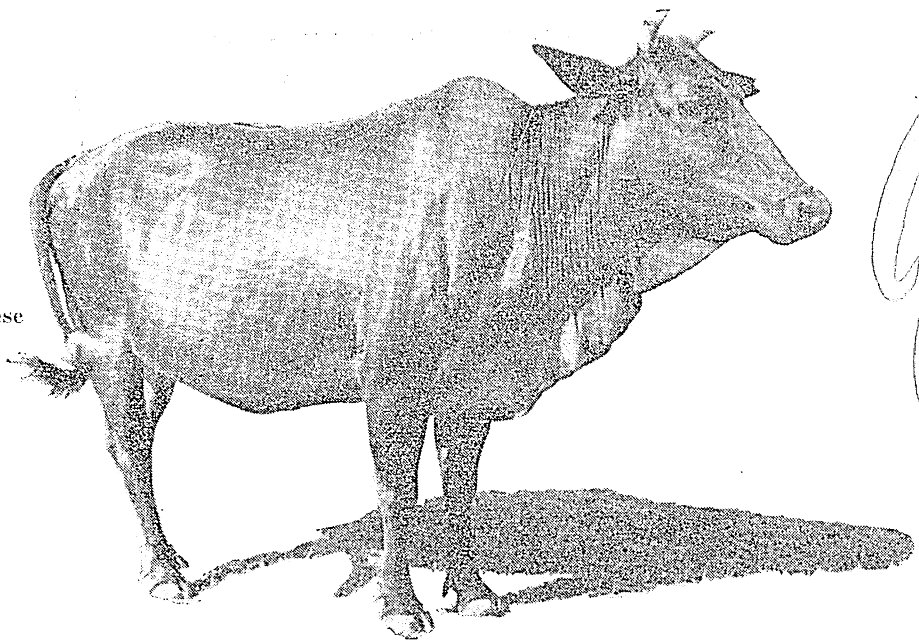
(1) Clean cultivation is very important to control the pest effectively and all weeds growing in the vicinity of mustard fields and serving as alternate food plants for the pests should be destroyed and burnt.

(2) In the early stages infested shoots should be pruned and the aphids destroyed. This simple and timely operation will keep the pest from multiplying.

(3) Dusting may be done with one to four per cent actual nicotine at the rate of 15-20 lb. per acre.

(4) Dusting with rotenone 0.5 to 0.75 per cent and pyrethrin (one part of 0.9 per cent pyrethrin in five parts of talc) may be done at the rate of 15-20 lb. per acre according to the density of the pest-population.

Heavy infestation of aphids will require the dusting operations to be repeated at weekly intervals for an effective control of the pest.



Nepalese local cow

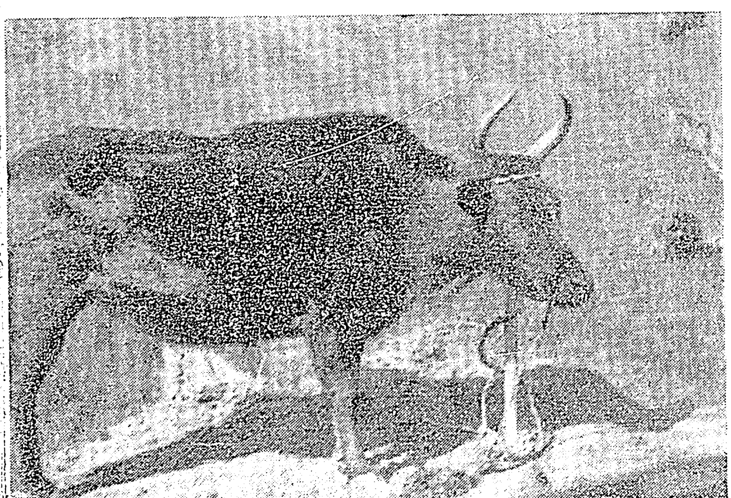
Yak in The Nepal Himalayas

By G. P. SHARMA,
Livestock and Dairy Development Officer, Government of Nepal

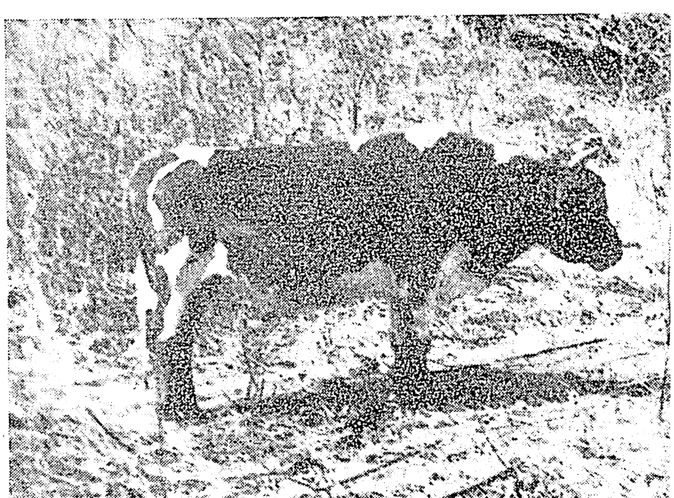
MANY people are familiar with the word yak but the habit and habitat, general characteristics, utility of this animal, etc. are comparatively unknown. This is because suitable literature on the subject is not available due to the secluded state of snow-covered areas where this animal is found. The common belief that this animal is primarily used as a beast of burden in the snowy areas is quite erroneous, as in Nepal, the yak is kept specially for two purposes, viz. wool production and cross breeding.

The yak belongs to the bison group of animals, which includes also the bisons of Europe and America. The yak, however, is inter-fertile with the animals of the taurine group. Accordingly, the yaks are mated with ordinary cattle to produce hybrids,

"Urang" (cow)



"Kirko" (bull)



which are of great utility in the area. But it is rather peculiar that among the hybrids while the males remain sterile, the females reproduce normally.

HABITS AND HABITAT

The original home of the yak is believed to be the cold regions of Tibet and Siberia. Many herds of this animal are, however, found along the snow-covered mountain ranges of northern Nepal. But it cannot be said at present whether these animals actually belong to this part of Nepal or were originally imported from the neighbouring country, Tibet. These animals are usually reared on the ranch-system and the breeders drive them over long distances in the snow and semi-snow ranges in search of pasture. From June to November the animals are kept at an altitude of 12,000-16,000 ft. After this period they are gradually driven down to lower altitudes, and by January they come down to a region of about 10,000 ft. in height where they remain for the three subsequent months. As these places begin to warm up in April, the animals again set out for higher regions. From the point of view of pasture, the first three months of the year are really hard for the female yak. As a result, milk yield in the females becomes very low during this period. The only trees that remain green during this period are *Quercus incana, Q. semicarpifolia* and *Q. dialatata.* The herdsmen utilize the leaves of these trees to provide green roughage to their stock. Though very fibrous and fed in small quantities, these leaves save the animals from starvation. At one place called Langtang, slices of dried turnips, soaked in warm water, are also fed to the animals as a supplementary feed. But this does not seem to be a common practice.

These animals are never stalled except in the very young stage when they happen to be two-three months old. During the night all the animals are tied to wooden pegs in the open; a couple of dogs are provided to keep away the wild beasts. A heavy snowfall does not appear to cause much discomfort to these animals.

GENERAL CHARACTERISTICS

Both the males and females are attractive to look at with their long silken hair hanging below the neck, shoulders, stomach and thighs. Their body though heavy is compact and quite well-balanced. Their legs are short and strong, the hoofs black with pointed tips with the help of which they are able to run with speed on slopes.

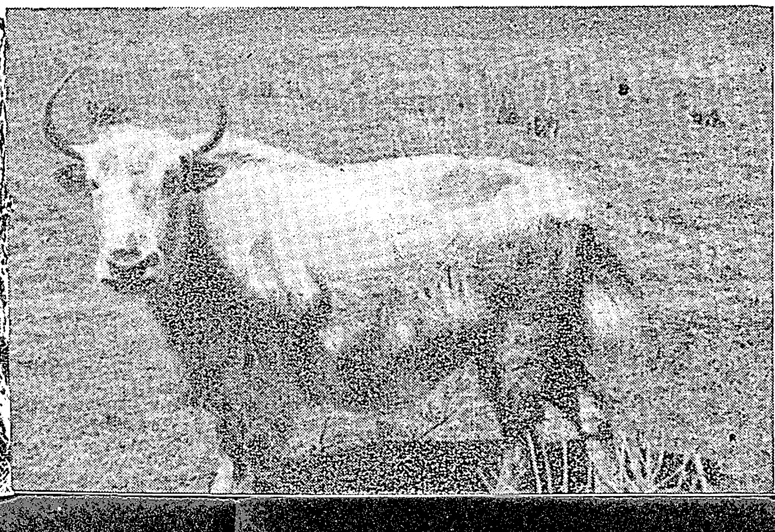
The colour of the female yak varies, though a mixture of black and white seems to be common. White, grey and black yaks are also to be found.

The yaks are docile if gently handled, in spite of their semi-wild nature. But a yak becomes nervous when any stranger approaches it.

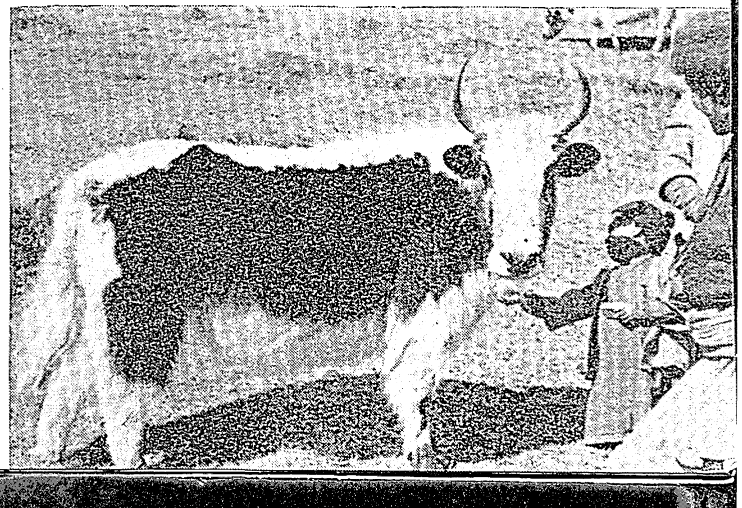
Both sexes have massive heads. The yak's head looks slightly drooping owing to a heavy hump. The forehead is broad and bulging. Whereas the face of the female yak is clean, though rough, that of the male yak is covered with curly hair. The horns are peculiarly curved, first protruding outwards, then curving upwards and inwards with pointed tips directed backwards. They are thicker and heavier in the male yak.

The neck is short and thick, carrying the head smartly on the level of the back. There is no dewlap. The chest is broad and muscular, though not deep. The hump is only slightly raised on the back but looks more developed from the front, and is heavier in the male yak. The shoulders are muscular and strong. The legs are short and moderately thick.

The female yak



"Dimjo" (cow)



The loin is strong and levelled with rounded hip-bones placed wide apart. The rump is short and slopy. The thighs are wide, muscular and well-developed. The tail is thick and short, though apparently it looks long due to the long bushy development of hair.

The udder is completely hidden within a thick growth of hair and is not much developed. The teats are thin and small.

UTILITY

As stated earlier the yak is commonly used for cross breeding. The hybrids are highly valued. Milk and wool are also obtained from the yaks. The long hair growing on the tail and other parts of the body is removed, usually in the months of May and June, and is used for making ropes, bags, floor-mattings, shoes, etc. These articles, though coarse, are warm and durable. The tail of the dead animal is cut at the tail-head and is sold as *chawar,* which is used by certain peoples on auspicious occasions. Yak's milk has a rich yellow colour, which enables one to recognize *ghee* prepared from it easily. This *ghee* sells at a cheaper rate, as compared to the cow-*ghee.* The average milk-yield per head is estimated to be approximately three pounds a day. Herd-keepers, however, calculate the production in terms of surplus which they can sell after meeting their family requirements. According to them, they sell a little less than one tin (approximately 37.5 lb.) of *ghee* per year from one female yak.

Average lactation period is $2\frac{1}{2}$ years with a dry period of only six months. Most of the cows calve during June-July. The average age of a heifer at the time of first calving is $3\frac{1}{2}$-4 years.

Two distinct hybrids are outcrossed from this species, locally called *urang* and *dimjo.* The former is produced by crossing a yak with a Nepalese cow, whereas the latter is the cross of a Tibetan bull found locally, and known as *kirko* with a female yak. Among the hybrids, the female produces more milk than either of the parent species, and the males though infertile are very strong and swift for carrying loads or drawing the plough. *Urang* is suitable for regions of lower altitude, from 7,000 to 11,000 ft. *Dimjo,* on the other hand, is reared in areas 9,000 to 16,000 ft. above the sea-level. The latter has also longer hair than the former which can be used as a substitute for wool.

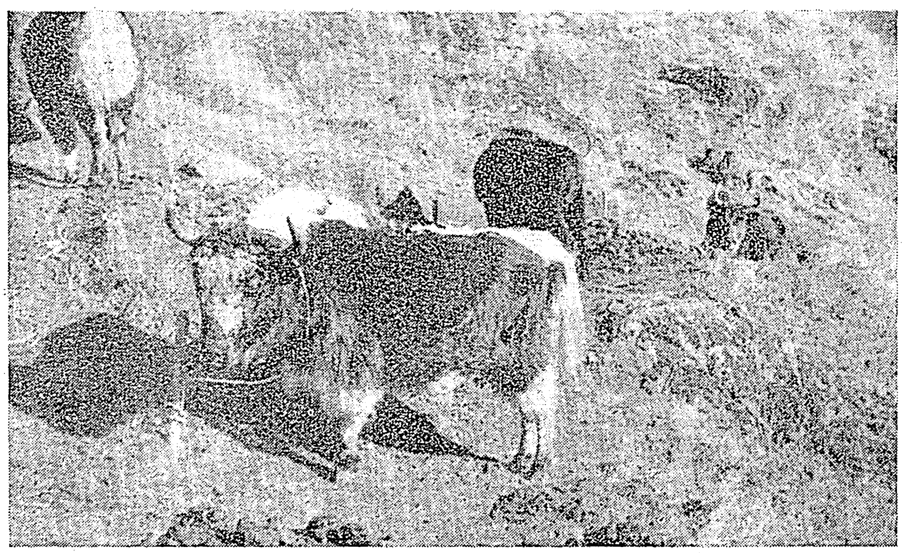
CONCLUSION

From the economic point of view, the yak and its hybrids are of great importance in the Himalayan regions. The ordinary cows and buffaloes cannot thrive in the climate of this region and the scope for profitable agriculture is very limited. The warm and durable articles prepared from the hair of these animals enable human beings to withstand the rigours of severely cold climate of these areas. The beef from yaks supplies proteins of good quality for providing nourishment to the people.

Another important product is milk which brings cash to the herd-owners to buy foodgrains and other necessities. Most of the milk is converted into butter and *ghee* and the former is exported to Tibet; the latter is brought down to the markets of Khatmandu and India.

Hybridization by a wise and more careful selection is expected to go a long way to produce animals of higher economic value which would ultimately raise the living standards of the local people.

The male yak



BUILDING UP A BETTER EWE FLOCK

(*Continued from page 21*)

In addition to the concentrates, they may each be given two to three pounds of green fodder, when available.

PREPARING EWES FOR BREEDING

Preparing the ewes for the breeding season is an important aspect which will have a direct bearing on their fertility. Ewes in a low condition must get extra feed. Provision of nutritious and special feed for two or three weeks prior to mating is a commendable practice. All ewes must be crutched before they are put to the ram. Crutching is the operation of clipping off of all tags or matted wool, hair and dung deposits around the tail and the inside of the things down to the point of the hock.

CARE DURING PREGNANCY

Ewes require nutritious feed, particularly during the last six to eight weeks of pregnancy. Lambs from ewes fed well during this period will be big and heavy, while those from ill-fed ewes will be small and poor in condition. The following points are worth remembering when handling in-lamb ewes:

(1) Pregnant ewes should not be chased and made to run

(2) They should not be frightened; particularly stray dogs should not be allowed to come near them

(3) They should never be driven through narrow passages

(4) Pens should be properly repaired and strengthened before the onset of the lambing season to avoid any mishaps from the attack of wild animals; the passages should also be strengthened

(5) Rough handling of ewes should be arrived

(6) Overcrowding of ewes should be arrived

(7) Ewes should not be driven long distances; during the hottest part of day, they should be brought under shade

(*Contd. on page 30*)

 (Contd. from page 15)

TREATMENT

Inspite of the coming in of so many wonder drugs like penicillin and other antibiotics, unfortunately nothing is so far known to cure rabies, once the disease is established.

When rabies virus, taken from a naturally occurring case in a dog, is artificially inoculated into the brain of a rabbit, it dies in about 21 days. This virus as it occurs in nature is called 'street' virus. When 'street' virus is passed through the brain of a number of rabbits it gets modified, and the animal dies in about a week's period. When a stage is reached at which the period from infection to death does not decrease further, but remains constant, the virus is termed a 'fixed' virus.

A vaccine is prepared by using the 'fixed' virus in the brain of animals like the sheep. Any case of animal bite in animals or human beings, particularly if unprovoked, should be regarded as serious and a qualified doctor or a veterinarian should immediately be consulted, as the case demands. In vaccination, advantage is taken of the long period (incubation period) generally required for the manifestation of symptoms after infection. We vaccinate the bitten animal or human being in the hope that immunity is produced before the incubation period is over.

In this connection, it is necessary to remember that:

(i) The rabies virus may be present in the saliva of a dog up to ten days before the onset of symptoms.

(ii) If it is possible to keep the rabid animal under observation, it should never be killed. If the animal remains in apparent normal health up to 10 days, there is no danger to the bitten person or animal. However, a doctor should always be consulted as early as possible for the advisability of giving anti-rabic vaccine.

(iii) If a dog is bitten by another animal which is rabid or becomes rabid during the 10 days of observation, or has been killed or is untraceable, the bitten dog should prferably be killed. If this is not possible due to some special reasons, the animal should get anti-rabic vaccine immediately and should be considered as dangerous for six months. It should particularly be watched and kept under confinement for the first three months.

(iv) If the mouth of a dog is to be examined, thick leather gloves should be used.

(v) All wounds inflicted by animal bites, and particularly the unprovoked ones, should immediately be thoroughly washed with soap and water. Then the wound should be dried and cauterized with carbolic acid keeping in view that all deep portions of the wound are also properly touched. After application of pure carbolic acid, methylated spirit should be applied to neutralize the excess of acid. If carbolic acid is not available, tincture of iodine will serve the purpose.

(vi) Though there is no danger of infection through an unbroken skin, licking by pet dogs should always be discouraged.

(vii) Consumption of boiled milk of a rabid milch animal or the handling of a dog which has been recently bitten by a rabid animal do not call for any treatment, unless of course, if some wounds on any part of the body are known to have been definitely smeared with saliva.

(viii) Clothes soiled by a rabid animal need not be destroyed. Soaking such clothes in strong phenyl or lysol lotion and drying them in the sun is enough to destroy the rabies virus.

PREVENTIVE MEASURES

The following measures will help in the control of rabies in our country:

(i) Ownerless street dogs should be destroyed as far as possible.

(ii) All pet dogs should be kept immunized by regular use of anti-rabic vaccine. A single dose of the special vaccine inoculated every year produces a reasonably good immunity.

(iii) Registration and licensing of dogs should be enforced and vaccination should be a prerequisite to registration.

(iv) All dogs bitten by rabid dogs should be destroyed. If impossible, the bitten animal should be vaccinated at once and kept under observation for six months.

(v) Health authorities should be notified of any affected and suspected cases.

(vi) Jackals should be destroyed as far as possible in cooperation with the Forest Department.

(vii) Mass education on the seriousness of rabies should be undertaken.

CONTRIBUTORS ARE REQUESTED

to kindly submit two copies of all articles, notes, etc. intended for publication in "Indian Farming". The articles should be clean-typed in double space on one side of paper, leaving a sufficient margin on the left-hand side. Contributions may be addressed to the Editor, "Indian Farming", Indian Council of Agricultural Research, Jamnagar House Hutments, Mansingh Road, New Delhi 2.

MEN OF THE MONTH

(*Contd. from page 6*)

Mr. Joseph breeds his own strain, taking care that the fittest birds are selected. He prefers birds two to three years old and does not include in his breeding pen the birds that have been sick even once. The birds kept by Mr. Joseph produce eggs of first class quality too and have won for him several prizes on that account. He is a voracious reader of literature on poultry, both foreign and Indian, and maintains a good library on this subject.

JOSEPH INSPIRES JOHNSON

Mr. Joseph's brilliant success in the art of poultry-keeping has inspired another colleague of his, Mr. A. N. Johnson, who is his neighbour. Mr. Johnson came over to Ajmer, attracted by the scenic beauty of this ancient city, in search of a job after doing his M.Sc. from the Agra University, in 1941. The interest in poultry-keeping then prevailing in Ajmer lured him to this hobby. But the real incentive was provided by his neighbour, Mr. Joseph. The birds that Mr. Johnson reared up were of such fine quality that drew appreciative remarks from a seasoned poultry-keeper like Mr. Joseph, who advised him to enter his birds in the Jaipur Show. Mr. Johnson sent eight birds to the show to compete and it was remarkable that he could win as many as seven prizes. Encouraged by his success Mr. Johnson became more enthusiastic about poultry-keeping, became a member of the Indian Poultry Club and participated in discussions on poultry with the other members of the Club as well as the local poultry officers. In this way he acquired much useful information about the various aspects of poultry-keeping. Besides, Mr. Joseph was there as his constant adviser and guide.

Mr. Johnson first took to the rearing of Rhodes but in 1946, he changed over to a different breed altogether, the White Leghorns. "This I did merely to avoid competition from seasoned poultry-keepers of Ajmer who were all patrons of the Rhode Island Red breed." But as ill luck would have it, Ranikhet disease broke out among his flock, practically wiping it away, and only four females survived the attack. To this depleted number he added one male purchased from the Mission Poultry Farm, Etah, and took these five birds to the All-India Poultry Show held for the first time along with other poultry-keepers of Ajmer. Only the male got a first prize. After returning from the Show, he took to breeding seriously and, thereafter, won a large number of prizes, including 24 out of a total of 86 prizes distributed at the All-India Show held in 1952.

Mr. Johnson attributes the good health of his poultry to a liberal supply of green feeds to them. He also gives them grit containing a good percentage of calcium in it as this imparts that lustre and hardness to the shell which is a characteristic of eggs of good quality.

Mr. Johnson is all praise for poultry-keeping, which he said had made meat and eggs a major item in their daily menu. According to him, the birds are generally self-supporting and in addition, they provide nourishing food to the family.

BUILDING UP A BETTER EWE FLOCK

(*Contd. from page 27*)

(8) They should not be allowed to jump over hedges or ditches

DURING LAMBING

Lambing may occur in the pens or in the grazing field. If any ewe lambs in the field, the shepherd must keep a very careful watch over her. Otherwise, there will be every chance of such ewes being left behind and getting lost in the grazing areas in the evening. An ewe normally takes about an hour to lamb after the first appearance of the water bag. A few hours before lambing, an ewe is disinclined to feed, is restless and tries to seclude itself from the rest of the flock. There is a slight swelling of the genitalia, with a slight flow of mucous from the vagina. No special care or assistance is ordinarily necessary. If an ewe has been found straining for a long interval, say for two or three hours, and the lamb does not come out, however, ready veterinary aid should be provided.

After the lamb has been born, the ewe and lamb should never be separated at least for 24 hours. After that, the lamb may be retained in the pen and the ewe allowed to go out for grazing daily. For about a month the ewes must be brought back to the pen for an hour at noon to suckle their lambs.

GENERAL MANAGEMENT

A proper care of the ewes should include dosing them for worms, and a regular dipping given to them for external parasites.

Phenothiazine is quite an effective remedy for internal parasites. In the absence of phenothiazine, the following worm mixture may be administered in doses of 2 to 2½ ounces accroding to age and size:

Copper sulphate	8 ounces
Powdered mustard	4 ,,
Water to make up	3 gallons

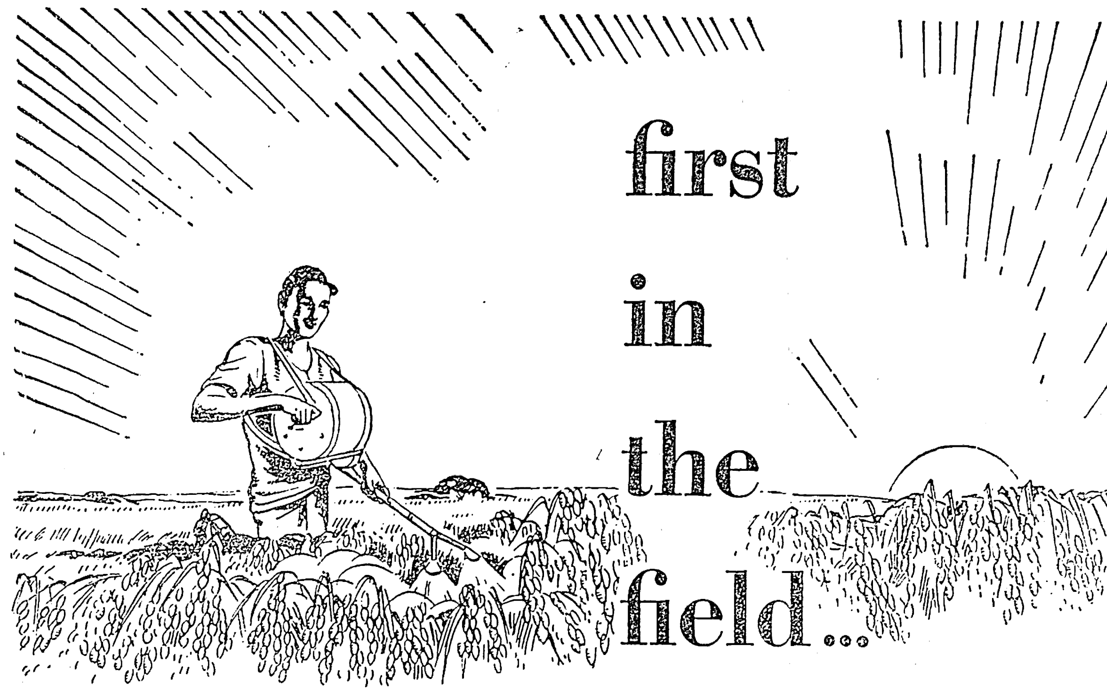
The solution must be freshly prepared and great care exercised to see that no particle of copper sulphate remains undissolved.

All ewes must be dipped four weeks after each shearing to free them from external parasites like mites, lice and ticks. Any patent sheep-dip may be employed for the purpose, but it is always desirable to avoid arsenical dips to prevent any likelihood of inadvertent poisoning of animals or men in the locality.

The blow-fly menace should be minimised by crutching and by applying fly repellants. For preventing attack by the sheep nasal-fly the nostrils may also be smeared with *neem*-oil.

Ewes of unusually small size, those with diseased udder and those which do not breed regularly must all be culled from time to time.

If the farmer pays attention to all these details, he can confidently hope and look for better returns from his flock of ewes.



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FEEDING DAIRY CATTLE - - - - - (*Contd. from page 22*)

including shark liver oil in the feed.

Cows get vitamin A in the form of carotene, which is mostly obtained through green fodder. A part of this carotene is converted into vitamin A and is found in milk-secretion. The vitamin-content varying with the quantity of carotene taken in milk is a good source of vitamin A, and it would naturally be desirable that milk contains vitamin A in sufficient quantities all the year round. However, since under our conditions green feed is not available during certain months, the quantity of carotene taken in by the cow is limited, and hence her milk during that period contains very little vitamin A.

Cows and buffaloes fed with ten grams (200,000 international units) of shark liver oil per head per day along with the dry roughage during the dry fodder period of $4\frac{1}{2}$ months, gave milk with a high vitamin A content. The maximum average total vitamin A potency was 1,066 international units per pound of milk in the case of the cow, and 1,155 units per pound in the case of the buffalo. The flavour of shark liver oil was not noticed in the milk. These values compare favourably with those for milk of cows and buffaloes receiving plenty of green grass.

EDITOR'S PAGE - - - - - - - (*Contd. from page 3*)

of nine months only, while those of 1952 the entire year of 12 months. The greater consumption of the fertilizer in 1953 is revealing and it would be safe to assume that this was a direct result of the campaign and it went into the production of paddy by the improved method. If that is so, the fact is itself an eloquent testimony to the success of the campaign.

The success of this campaign was mainly due to its planning and organization. The plan followed in publicising the Japanese method of rice cultivation should appropriately be looked upon as a model for any such campaigns contemplated to be undertaken in future.

Regd. No. B. 6082

INDIAN FARMING

Collecting hay in a paddy field in Bengal

PRICE 12 ANNAS　　MARCH 1954　　VOLUME III. NO. 12

INDIAN FARMING

Vol. III New Series No. 12 Mar. 1954

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Printed and published by P. H. Raman at the Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7.

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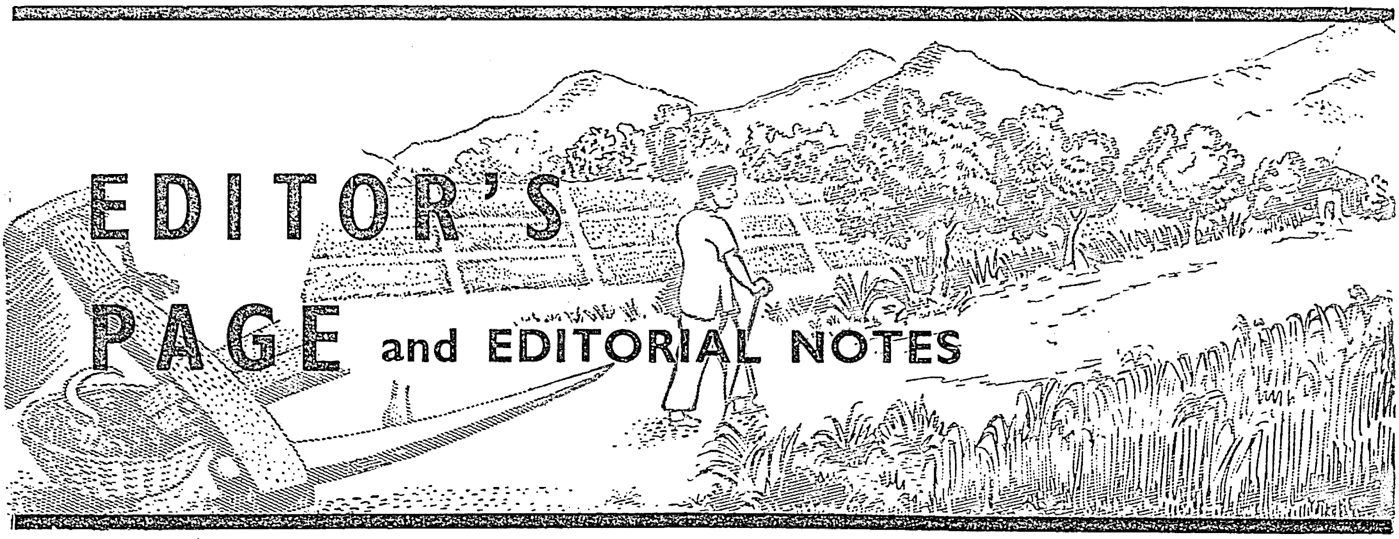


I. C. A. R. RESEARCH PUBLICATIONS

It is accepted that research should be constantly carried out in order to evolve new techniques to help the farmer to increase production. The results of these researches form the material which is the basis of extension work. That being so, the results of these researches, their methods, their details and the conclusions drawn from them should be easily and generally available. They should be available for two purposes—first to acquaint the person who is carrying on research with the latest developments in his particular subject or project of studies, and secondly to offer material to the extension writer so that the technique evolved or the results achieved may be available to the farmers in a language or in a manner which they can appreciate and understand.

Thus the research publications are concerned only with reporting the scientific aspect of any research project and the results obtained therefrom. It does not necessarily mean that only positive and helpful results of research should be published. In many cases the published literature may relate only to methods or technique for carrying out a particular research project, and in other cases it may even report negative results of research. Even a negative result is helpful so that the particular technique or formula or methods may be avoided by the farmer.

Since research publications form the basis of all extension information, it is necessary that the research journals and publications are maintained at a proper standard of dependability in respect of research work reported therein. The research work reported should be factual and only logical conclusions, uninfluenced by the personal inclinations of the research workers, should be incorporated. Then only the material could be properly utilized by extension writers for useful purposes.

Research publications by their very nature have a limited appeal and only technicians, research workers and workers in experimental stations can benefit by these publications. They are not meant for the village level workers or the actual farmers for their day to day work.

The Indian Council of Agricultural Research has been issuing a large number of research publications. The research publications can be broadly divided into two groups: (i) regular publications and (ii) occasional publications.

Under the regular publications may be grouped the research journals which are brought out at fixed intervals of time containing technical papers reporting results of research. There is one journal devoted to research in agricultural and allied sciences known as the "Indian Journal of Agricultural Science"; this was started in 1931. The other is devoted to animal husbandry subjects and is named as the "Indian Journal of Veterinary Science and Animal Husbandry." This includes research articles on animal nutrition, dairy science, animal diseases, etc. in addition to those

on purely animal husbandry subjects. This was also started in 1931.

The occasional publications are the monographs, bulletins, pamphlets in the research series and in the review series. The monographs contain an extensive treatment of a particular subject so as to form an all-inclusive self-contained book. The bulletins are less extensive and are confined to a particular aspect of a subject. The research pamphlets contain results of investigations which are more or less complete and review pamphlets, contain an up to date exposition and assessment of literature on a particular subject. In addition, there are other *ad hoc* publications issued from time to time.

The materials for these journals are mostly drawn from research workers in the fields of agriculture and animal husbandry either in the Central or State Research Institutes, or in agricultural colleges or even universities and private research institutions. The Indian Council of Agricultural Research subsidises throughout the country a large number of research projects; the data and other information obtained from these research projects form, in many cases, the basis of the articles included in the research journals. The research articles are written by the persons who have undertaken the research or are in charge of the research work. Similarly, the monographs, bulletins, research and review pamphlets are written by competent persons specially qualified to write on the particular subjects. Since they are written by competent authorities, these publications are looked upon as authoritative pronouncement on the particular subjects they deal with. And, therefore, the extension writer who culls out materials from these publications stands on a sure ground that the information he is passing on to the farmer is tested, verified, correct and dependable.

★

CORRECTION

January, 1954 *issue of "Indian Farming"*

In the block showing the candling appearance of eggs printed on page 17

For the caption at the top, i.e.
Fresh egg (Candling appearance)

Read Developed embryo (Candling appearance)

For the caption at the bottom, i.e.
Developed embryo (Candling appearance)

Read Fresh egg (Candling appearance)

MAN OF THE MONTH

Initiative and Help Produce 'Bajra' Crop

Farmer Bhadabhai

By P. U. OZA

WHETHER it is chain reaction to the recent campaign on Japanese method of paddy cultivation or growing awakening sweeping the countryside or a combination of both, I cannot say. Nevertheless the fact remains that at a number of places, some cultivators have, on their own initiative, experimented with different crops, following several features of the Japanese method and a few steps of their own formulation and have succeeded in producing remarkably high yields from their fields.

It is known all over that the two basic factors which lead to better yields are water and manures. Recent attempts by the Union and State Ministries of Agriculture in systematizing cultural practices in a number of crops, notably paddy, are beginning to yield encouraging results. Reports have been received of cultivators getting high yields in *jowar,* in *bajra,* and other crops by carrying out certain experiments on their own initiative and using a bit of imagination. It is to such cultivators that the country owes its present happy position regarding food situation.

A NEW METHOD AND UNHEARD OF YIELDS

One such cultivator is Bhada Bhima Kotadia of Mota Gundala in the Jetpur *taluka* in Saurashtra. For over 250 years the Kotadia family has raised groundnuts and *bajra* on a farm of 20 acres. The crop rotation records show that in this area a number of crops like *bajra,* wheat, *jowar,* and in recent days, rice have been taken but the yields have not been very satisfactory. The average *bajra* yield in this area has been 15 maunds per acre. As against this Bhadabhai was successful in getting 76 maunds on an acre, a record yield for that particular area.

Imagination Bumper

However, it is not the yield that matters in this particular case. What matters is that this farmer having been told about certain experiments carried out in Charota area of Gujarat decided to try this method which has been given the name of the Russian method, mainly because the experiments were based on an article appearing in a Gujarati daily of Ahmedabad, giving a vivid description of how a Russian farmer obtained a remarkably heavy yield of *bajri.*

STEPS TO HIGHER YIELDS

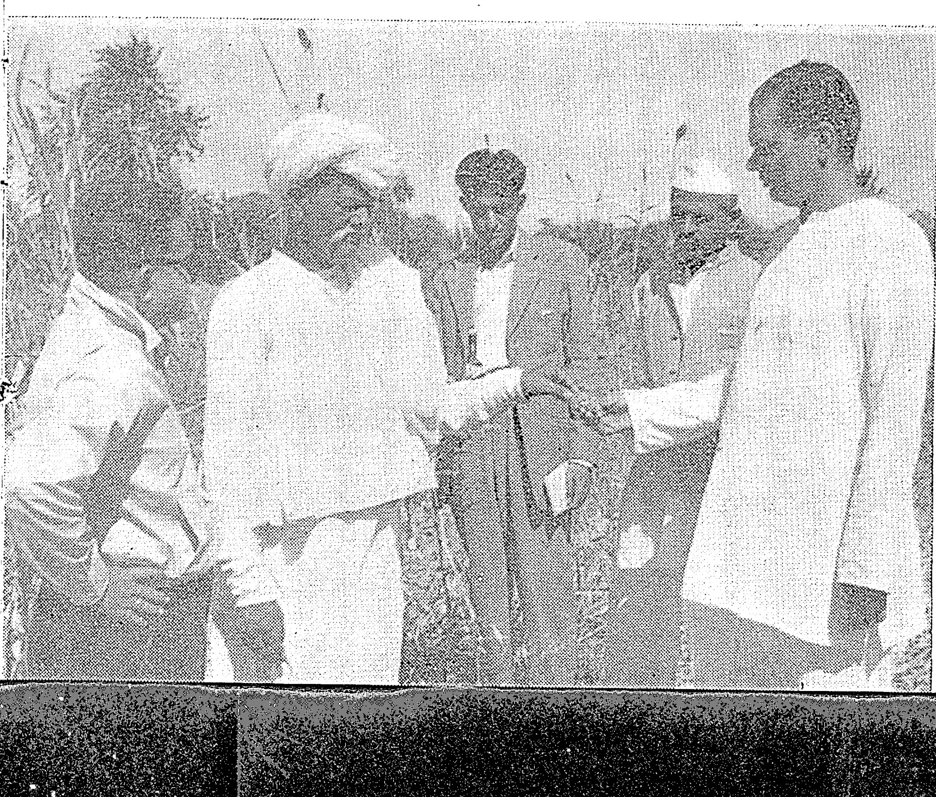
The method as described by the Saurashtra Agriculture Department has a number of features which call for almost garden conditions in *bajra* cultivation. In short, the main features of this method are:

(1) One irrigation is given to the field during the first week of June.

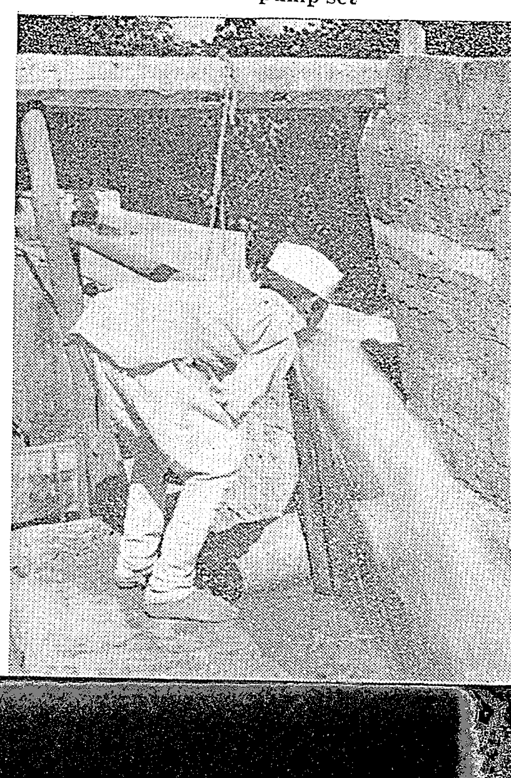
(2) After one week, twenty cartloads of farmyard or compost manure and 200 lb. of superphosphate per acre are spread followed by a second ploughing, after which harrowing and levelling is done. Three more ploughings followed by harrowing and levelling are also given.

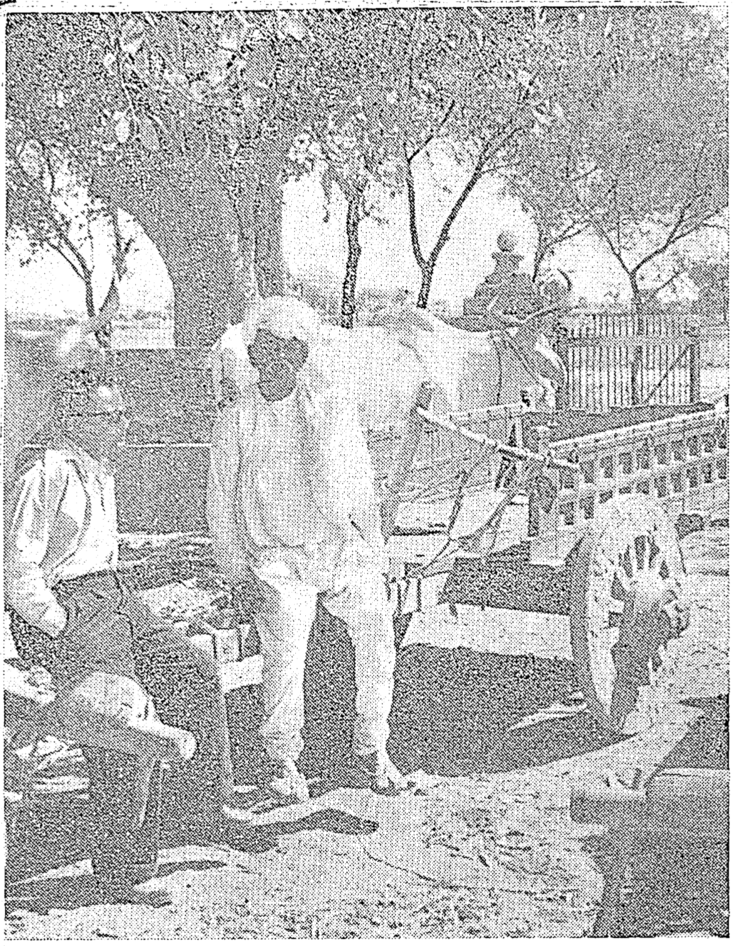
The typical farm-labourer with the owner

Farmer Kotadia shows a poorly ear-head to Extension Centre Principal



Well-water irrigates the land; thanks to a pump-set





Farm entrance—a typical Saurashtrian village scene

(3) When the field comes to a very fine tilth, it is marked in both directions by drawing a *dantal* with prongs 18 in. apart. At the places where these lines cross, *bajri*-seed is dibbled putting five to six grains per hill and covering it with fingers.

(4) The sprouts appear within four to five days time. Interculturing is done as in wheat. During the third week top-dressing of a manure-mixture containing groundnut cake eight parts, ammonium sulphate one part and superphosphate one part, is given around each hill, the rate being 200 lb. per acre.

(5) When the crop is about three to four weeks old, a wooden plank is drawn on the standing crop. When the crop resumes natural position, as a result of the stimulus, the plants produce profuse tillering. Hoeing is continued and done as often as possible.

(6) Just before flowering, the second dose of manure-mixture is given as top-dressing and mixed with soil by *khurpi*. If there are no rains, and there is a shortage of moisture, one irrigation is given after the application of second top-dressing.

(7) The harvesting is a continuous process in that ear-heads are harvested as they go on ripening and not all of them at a time. The ear-heads on the main stalks ripen earlier than those on the tillers.

(8) Compact and big-sized ear-heads from a uniform growth of the mature crop are preserved for seed purposes. The main principle to be observed in irrigating *bajri* crop is that when marked effect of want of moisture is visible, then only water should be given.

An interesting observation made by the Taluka Agricultural Officer was that the *bajri* crop raised experimentally after following the above instructions had previously given yields up to 2,500 lb. per acre. Even under rain-fed conditions, crops have given yields up to 800 lb. per acre as against the over-all average of 200 lb. per acre under the Saurashtra conditions.

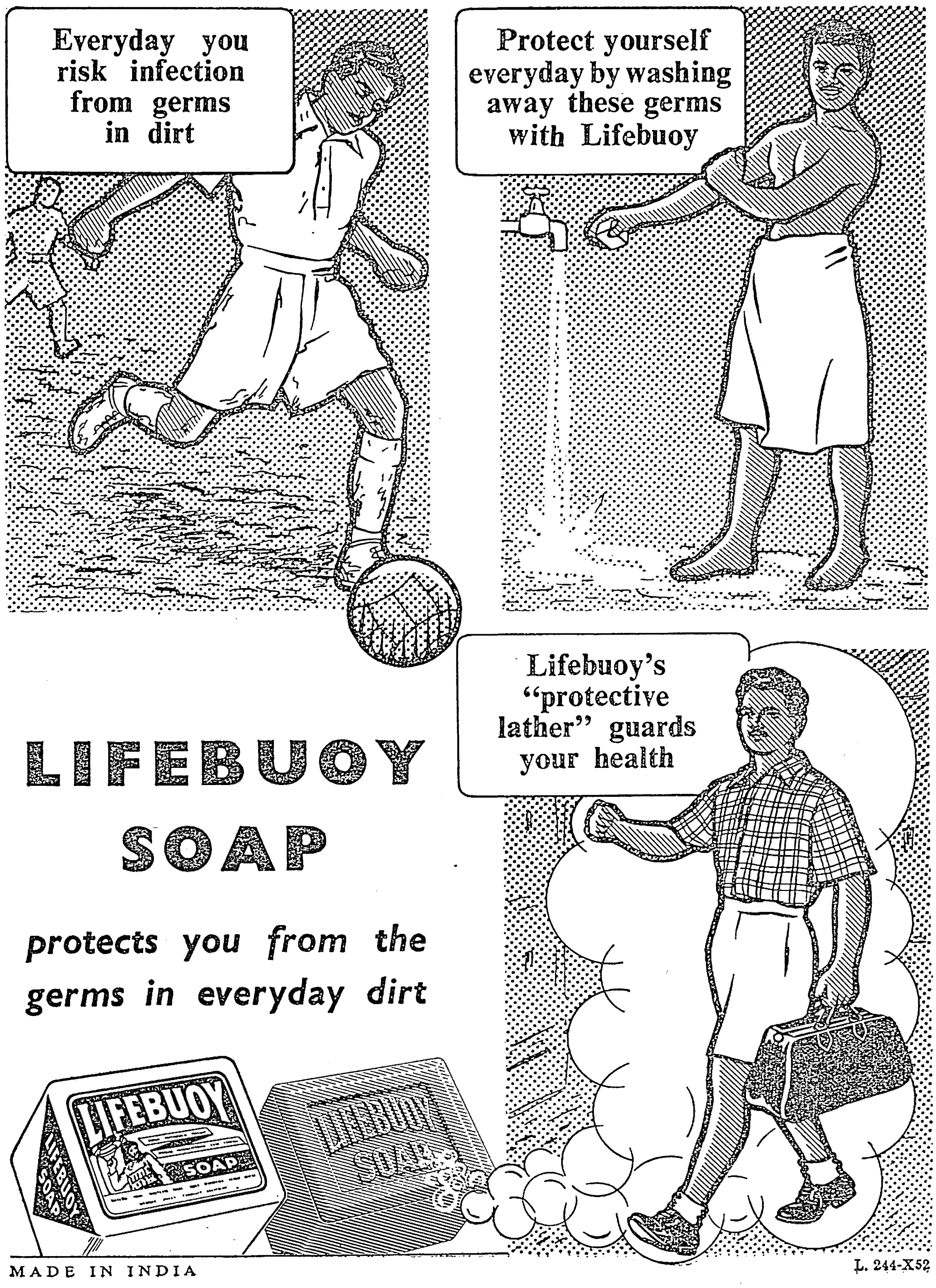
A NOBLE IDEA

On being asked why is it that he started this experiment on his own farm, I was told that the village of Mota Gundala wants to manage its own economies and is prepared to try any developmental programme to ensure that the collective income of the village increases. Otherwise, almost inevitably the villagers get into debts unless they marched with the times. This was a noble point of view and on an enquiry I found that the villagers have not to run after credit facilities. They try to progress on their own, slowly perhaps, by adopting improved techniques within their own means. Manure consciousness and an appreciation of the use of improved seeds was evident in this village and, as one of its leading farmers, Bhadabhai decided to give a lead by experimenting with this new method. Having a pumping set which irrigates his fields, dry periods normally do not bother this sturdy old farmer of 62. But for the failure of the set which prevented adequate watering of the crop during the dry spell preceding the ripening of the crop, he would have easily obtained much higher yield, more than the one reported. The experiment was carried out on one acre out of a 20-acre farm, but for the ensuing season he contemplates to spread this out on five additional acres, thus gradually enlarging the scope of his operation.

I was given an insight into the working of the minds of the villagers when we sat down to exchange views over a glass of milk. The farmers who had gathered round had stories to tell about how the village had come into being. They were proud of detailing how they were justifying their existence by successfully trying a new method whereby one of the leading farmers of the village got the highest *bajri* yield in Saurashtra. Some of the salient features brought out during the discussion showed that the experiment which was encouraged by the Assistant Agricultural Officer has succeeded beyond expectation. The second experiment was washed away due to incessant rains which this area had not experienced in recent times.

During the rainfall the village was completely cut off from outside world and the villagers have been clamouring for a causeway to be built over the nearby river to connect it to Dhoraji, a nearby district town. The village consisting of 1,500 persons with about 400 farms and 50 to 60 wells has a *panchayat*, a school, and a mutual help system whereby the financial needs of any one inhabitant, whenever such a necessity arises, are met from the resources of the others in the village. Thus as I stated earlier, the village is not indebted to any outside agency. Farmer Kotadia, who is also the village *patel*, has two sons Mandan and Natha, aged 32

(*Contd. on page 27*)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SEASONAL PESTS OF CROPS:

THE GREASY CUT-WORM *Agrotis Ypsilon* ROTT.— A SERIOUS PEST OF *Rabi* CROPS

By
E. S. NARAYANAN,
Head of the Division of Entomology, I. A. R. I., New Delhi

As in all the highly developed animal groups, in the case of insects also we come across various kinds of characters like the weak, the beneficial, the aggressive, the brave, the cunning and the cowardly. To the last category belongs the cut-worm, *Agrotis ypsilon* Rott. whose caterpillars hide themselves in the soil during the day and prowl at night, committing acts of vandalism on the young and tender plants under cover of darkness. These caterpillars not only feed themselves on the plants, which in itself is bad enough, but also destroy the tender plants by cutting at their roots. The damage caused by them is indeed very great sometimes.

In our country, the cut-worms are usually the major pests of gram, although at times a number of other *rabi*-crops are also attacked by them. Of the recorded species causing some kind of damage or the other in the Indian Union, *A. ypsilon* is undoubtedly the most widely distributed and also the most serious one. The pest has been reported from almost all the regions of northern India forming a continuous belt from the Punjab in the west to Bengal in the east and Madhya Pradesh in the south stretching as far as Nagpur. The *tal* areas near Mokameh in Bihar are the most seriously affected areas. Here the pests live and multiply by hiding themselves in the soil left moist by the receding flood-waters of the river Ganga, and destroy annually *rabi*-crops worth several lakhs of rupees. The cut-worms love a moist soil and drought is their dreadful enemy. The portion of the Gangetic plains of north India lying parallel and close to the Himalayas, seems to be their chosen abode. Outside India, the pest has been recorded from East Pakistan (Jessore and Rangpur) and West Pakistan (Lyallpur), North and South America, Europe, North Africa, Egypt, Japan, China, Tibet, Ceylon, Java, Australia, New Zealand and Hawaii. In some of these places it is popularly known as the black cut-worm.

Besides the gram crop which is severely infested year after year by this species of cut-worm, it has also been observed causing extensive damage to the other *rabi*-crops, especially those that are grown on lands that remain under water during the rainy season. The pest has been found to cause damage to gram, groundnut, sweet potato, cauliflower, cabbage, lucerne and wheat at Pusa (Bihar), to gram at Gaya, to opium at Sahabad, to clover at Nagpur, and to potato at Jabalpur. Valuable leguminous crops like *masur*, *khesari* and peas growing in the *tal* or flooded areas in Mokameh on the banks of the Ganga in Bihar, suffer severely from the depredations of this pest year after year. Very recently the pest has been reported to be causing extensive damage to the potato crop as well as tubers at Patna, so much so that it is now believed to be a major pest of potato throughout the Indian Union. At the I.A.R.I. farm at Delhi and in the cultivators' fields in the Delhi State, the pest has been observed to infest gram, potato, tobacco and mustard, and vegetable crops like cabbage, cauliflower, etc.

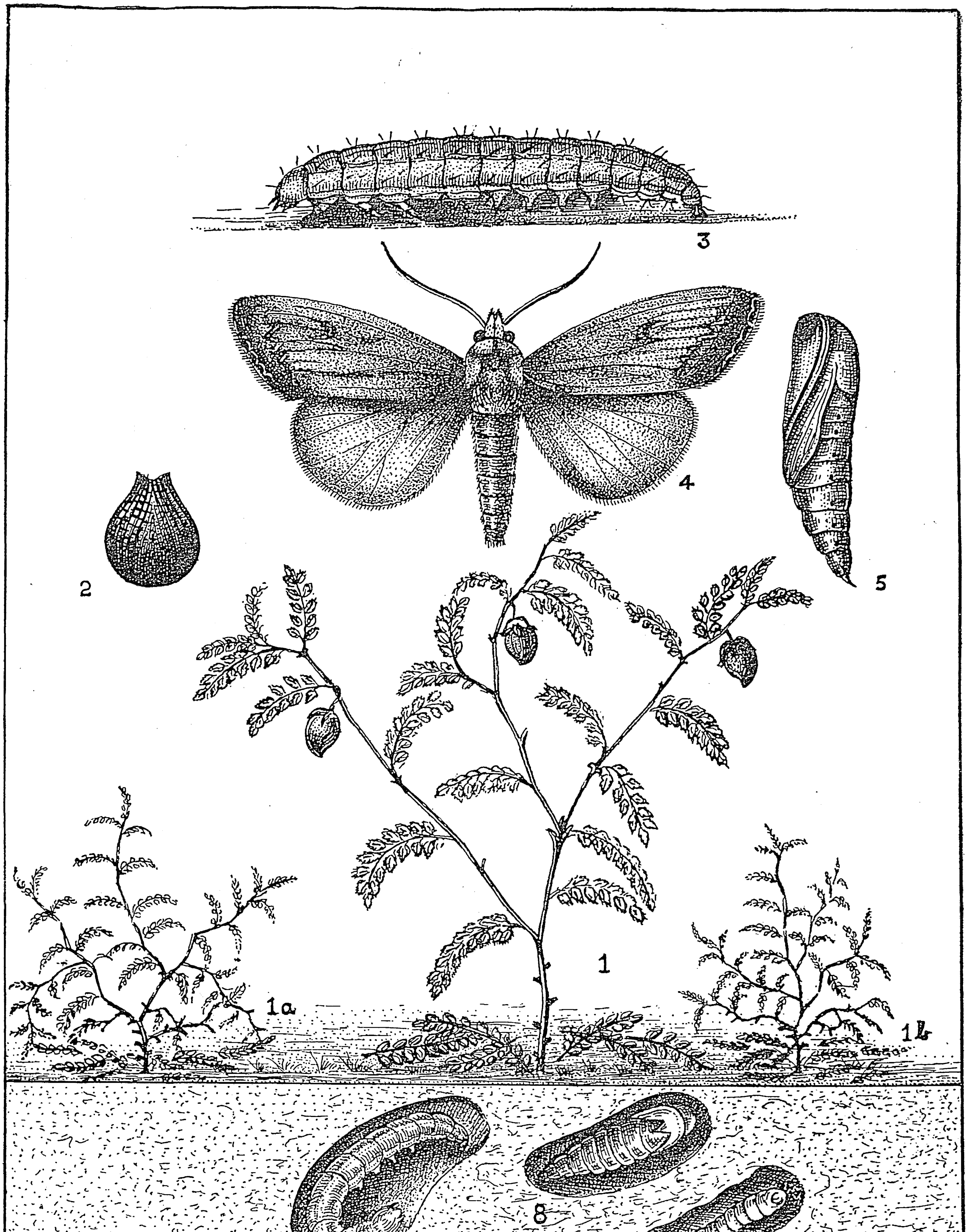
HABITS AND HABITAT

Though the moths can be found in the field even in the beginning or middle of October, they appear in large numbers from November onwards only. The peak period of their activity lasts for four months, from December to March. During these months the caterpillars are found in large numbers and severely damage the tender *rabi*-crops that have sprouted and grown to a height of about six inches or more. During the day time moths hide themselves under dried twigs and leaves or in the cracks in the soil. When they are touched they feign death. If disturbed they shoot forth to another dark corner or a suitable hiding place by characteristic jerky movements. When at rest during the day their legs and wings are held close to the body. During the night, however, their wings remain horizontal and not applied to the body as in the day time. Also the body is as much above the ground as the legs can raise it.

As soon as twilight sets in they come out of their hiding places and fly about in the field till it is completely dark. Then they start laying eggs on the host plants. Eggs are usually laid on the under surface of leaves or parts of stem which lie close to the ground. In *tal* lands near Mokameh the moths have showed marked preference to lay eggs on wet or muddy lands just after the flood water has reced-

"AGROTIS YPSILON" Rott.

1, 1a and 1b. Gram plants showing damage by the cut-worm 2. An egg 3. The caterpillar 4. The pupa 5. The moth 6. A caterpillar hiding itself during the day time 7. A larva pupating in the pupal chamber underground 8. The pupa underground


3
4
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ed. Indeed they have been observed to fly long distances to reach the end of their journey, this favoured spot and their haven. A single female moth is capable of laying as many as 30 eggs at a time on a particular spot, and has been observed to lay as many as 350 eggs during her lifetime. Usually the eggs are laid singly or in small scattered groups. The egg is minute, pretty and dome-shaped, creamy white in colour and about half a millimeter wide from one side to the other. As it develops the creamy white colour changes to a dull hue with a blackening at the top where the head of the developing caterpillar is located. The incubation period of the egg varies from about two days in the summer to about nine days during the winter months.

A peculiar habit of the freshly-emerged larva is that it has for its first meal the egg-shell from which it has emerged. Initial appetite thus satisfied it goes in search of its food. The newly-hatched larva is about 1.5 mm. long and is light yellowish-grey in colour. The young and the grown up caterpillars have got the peculiar habit of coiling themselves on the slightest touch and feigning death. For some time the young larva feeds upon fallen leaves on the soil or leaves that touch the ground. It has to pass through six stages before it becomes full-grown, when it measures about 1.75 inches in length. The full-grown larva is dark or dark brown in colour. These attack and feed themselves on the standing plants and often cut the plants at their roots. They remain hidden in the cracks or holes in the soil at a depth of about one inch during the day and assume the colour of the soil in which they hide and thus escape being noticed. They come out of their hiding places at night for the sole purpose of feeding themselves. It has been observed that sometimes after filling their stomach they carry some of the cut portions of the plant into their abodes. It is, therefore, not surprising that cannibalism should exist among the members of this greedy group characterized by excessive appetite. Young larvae are often attacked and consumed by the older ones and the older ones fight battles among themselves, and those that are defeated are mauled and eaten up. The larval period lasts for about a month and when it is very cold the duration is a few days more. In summer the larval period is shortened by several days. The full-grown larva pupates underground. The pupal period varies from about 10 days in summer to about 30 days in winter. The pupa measures about 20 mm. in length and is red brown in colour. Moths emerge from these pupae lying underground and crawl out of the tunnel that the larvae instinctively prepare while going underground to pupate. The moths mate soon after emergence and the female starts oviposition four to five days after its nuptials. The total life-cycle of the pest varies from one to two months according to the climatic conditions. Two broods have been observed during the peak season. The second brood is more aggressive than the first one and is responsible for more damage and destruction. During the lean days of rains and summer the pests lie and live scattered in weeds growing in waste lands and begin their normal activity with the advent of winter.

CONTROL MEASURES

The control of the cut-worms and particularly of *Agrotis ypsilon,* which is polyphagous by habit, is one of the most difficult problems that have to be faced. As the caterpillars always remain underground and choose moist earth as their abode, their incidence and abundance can be controlled to a great extent by breaking up the sods in the fields to be sown. Particularly in low lands that are annually flooded by the swollen rivers, as in Bihar, ploughing the fields, say four to five times before sowing, will reduce the incidence of the pest to a very great extent. Flooding the areas that are suspected to harbour a large number of pests may also be useful. By this simple agricultural operation not only are many caterpillars killed by drowning, but also a large number of them comes to the surface where they fall victim to birds, parasites and predators. Clean cultivation and early ploughing of the fields that are going to be sown with *rabi*-crops, will give really

(*Continued on page 32*)

FIGHTING FAMINE AND DROUGHT BY SIMPLE MEANS

By **S. B. SINGH**, Director of Agriculture and **RAM KRISHAN**, Assistant Development Commissioner (Agriculture), Uttar Pradesh

THERE are vast areas in Uttar Pradesh which are very deficient in rainfall. As a result the crop yields in these areas are very low and the people are poor and under-nourished. Besides, partial or total crop failures have also been often occurring in various parts of the State, such as the eastern districts, for the last many years due to inadequate and unequal distribution of rainfall. Such failures of crops result in famine conditions and leave the population in a precarious state.

The failure of crops can be avoided by resorting to certain practices of farming evolved after years of research and experimentation. The main object of adopting these practices is to conserve carefully whatever little amount of rainfall is received for plant growth. Normally, a lot of rainfall water either runs off from the fields or is evaporated and is thus lost to the plants. It is, therefore, desirable to reduce or completely stop this drain by retarding the speed and reducing the quantity of the run-off water and allowing it to percolate into the lower layers of the soil for being utilised at later stages of plant growth when there is deficiency of moisture. This can go a long way to help fight famine and drought to a great extent.

LEVELLING AND BUNDING OF FIELDS

The levelling and bunding of the fields before the rains set in is one of the most important practices recommended. The uneven land should, as far as possible, be levelled before bunding. For bunding, the land should be divided into small plots, say of $\frac{1}{2}$ to $\frac{1}{4}$ acre, each having bunds about one to two feet high. These bunds can be easily prepared with the help of spades or mould-board ploughs.

The greater the slope of the land, the larger should be the size of the bunds and lesser the distance between two bunds. The distance between two bunds mainly depends upon the vertical fall in the level of the field, and in general, it is recommended that a bund should be laid down at every one foot of the vertical fall in the level of the field. The height of such a bund should normally be three feet with a top-width of two feet. The bunds are always constructed across the slope and along the contours.

Proper bunding and levelling of the fields check the rain-water from running off. They also help in checking the washing away of soil particles and loss of fertility due to erosion.

(*Contd. on page 24*)

Poultry-Lice

By P. BALARAMA MENON,
Division of Parasitology, Indian Veterinary Research
Institute, Izatnagar

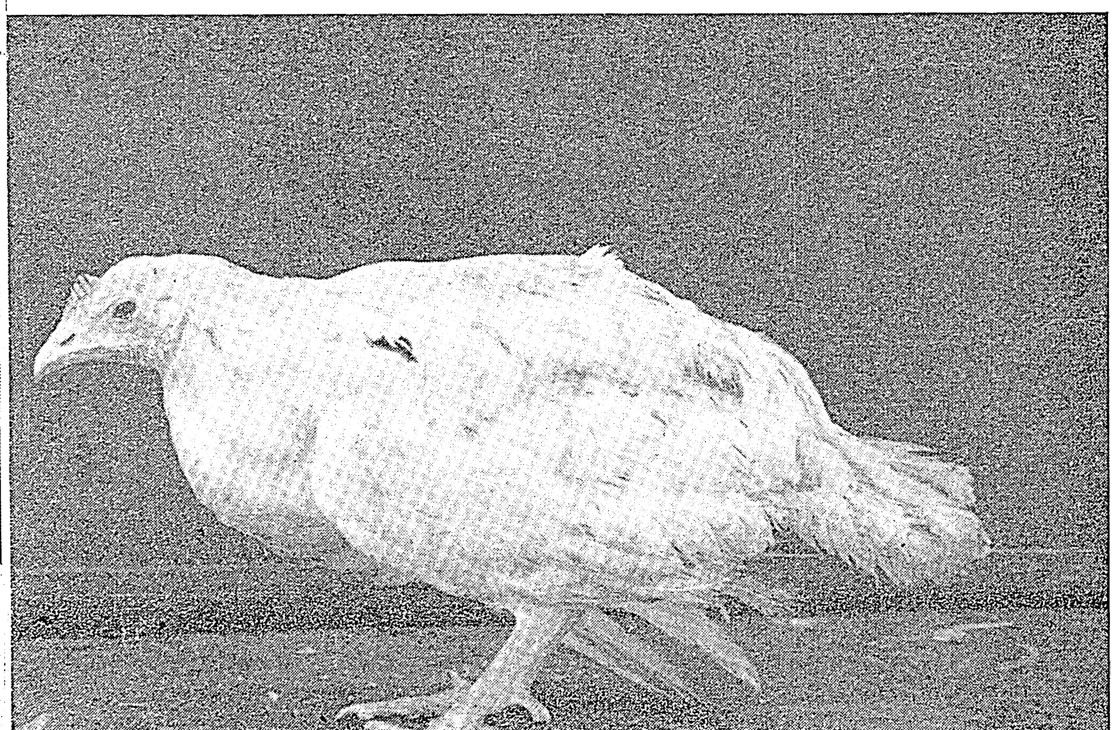
THE estimated poultry-population of the Indian Union consists of 69 million birds valued at 104.7 million rupees. A little less than a third of these birds are laying-hens producing annually 1,341 million eggs valued at 107.3 million rupees. The vast majority of these birds and eggs are in the villages. Thus it is clear that poultry occupies an important place in the rural economy of India. The study of insect pests of the poultry birds, and of other arthropods which play an important part in the transmission, causation and spread of poultry diseases or otherwise affect the poultry birds, is, therefore, of great importance.

The fowl is subject to the attacks of a large number of external parasites belonging to distinct groups, viz. lice, mites, ticks, fleas, flies, etc. The extent of damage caused by these external parasites is not generally fully realized. The attacks by these parasites cause enormous losses and are one of the most important factors operating against the development of the industry. It is obvious, therefore, that we should have an adequate knowledge to enable us to recognise these pests, prevent their attack and control them. We shall only deal with poultry-lice here which are a serious problem to the poultry-breeder as the irritation caused by them makes the bird exceedingly restless with consequent lowering of its condition and egg-production.

THE BITING-LICE

Lice are generally of two kinds—the biting-lice and the sucking lice; only the former are present on birds. The biting-lice have broad heads with mouth-parts adapted for biting and are small, flat-bodied, wingless insects which are permanent ectoparasites, both in the young and adult stages, on birds. Most are swift runners, having claws and hair to enable them to pass rapidly through the hair and feathers of the host. But others are quite slow and cling to the feathers by their jaws. They feed upon fragments of feathers, hair, epidermal scales and the dried blood collecting around wounds of the host. While they do not actually attack the flesh, they become very irritating and are often present in sufficient numbers to cause great discomfort and even death.

The elongated eggs or nits are glued singly on hairs or feathers of the host, and the young appear much the same as adults. They breed under very favourable conditions, having a fairly uniform heat from the body of the host to make them comfortable under most climatic conditions. The broods are over-



A lice-infested bird

lapping, and there are several generations a year.

The injury done by the biting-lice is largely due to irritation or to itching caused by the creeping insects and their incessant gnawing at the skin. This irritation causes the bird to become exceedingly restless, thereby affecting its feeding habits and proper digestion. In addition, the wounds produced as a result of scratching serve as inlets for disease-producing organisms. A badly infested bird is in great distress, becomes restless and consequently emaciated, which predisposes it for the attack of pathogenic organisms. Moreover, egg-production is greatly reduced. A lousy flock of poultry is not a good investment. When lice are abundant uncleanliness and overcrowded conditions usually exist.

LICE INFESTING DOMESTIC FOWLS

More than forty different kinds of lice are said to occur on domestic fowls of which four kinds are commonly found on chickens. Losses due to poultry-lice are most evident among the young birds, but heavy infestations on older fowls result in loss of weight, lowered egg-production and lowered vitality. Though other maladies may present similar symptoms, infested fowls are droopy, with lowered wings and present an unkempt and ruffled appearance, and suffer from diarrhoea. The commoner lice of chickens are (1) the body-louse—a rapidly running species occurring on all parts of the fowl; it is light yellow in colour and about 2 mm. in length; it lays its eggs in large clusters, particularly on the small feathers below the vent; (2) the shaft-louse—which resembles the body-louse very closely but is smaller in size and occurs mainly on the shafts of the feathers; it is said to gain its nourishment from bards and scales of the feathers and is, therefore, not so irritating as the body-louse; (3) the head-louse—a dark greyish species about 2 mm. in length, infesting the head and neck of young chickens to which it is most injurious and (4) the fluff-louse—a very small and broad species about 1 mm. in length, pale in colour and seldom abundant.

CONTROL OF POULTRY-LICE

As in other cases of disease and pest control, prevention is always better than cure. The birds should be kept in houses which are well-lighted, sufficiently ventilated and properly cleaned every day. New birds should always be treated for lice and segregated for at least a fortnight before allowing to mix with the home flock. The breeding birds should be specially attended to as it is through them that lice and other parasites get distributed in the new flock.

Application of sodium fluoride: No remedy has given such uniformly satisfactory results in the control of lice of all kinds on domesticated birds as sodium fluoride. This can be obtained in two forms, a white powder or commercial form (90 to 98 per cent pure) and in fine crystals or chemically pure form. For effective lice-control, the former is preferable. It retains its efficiency almost indefinitely if kept in a dry place in stopped bottles or cans. It can be applied by the "pinch-method" or by means of a salt-shaker type of applicator (old cuticura powder tins suitably modified should serve the purpose). In the former method about ten pinches (amount held between thumb and forefinger) of the chemical are distributed at different parts of the body—head, neck, breast, vent, thighs, wings and tail, and rubbed thoroughly into the feathers. The birds when treated should be held over a shallow pan or newspaper in order that the excess of the chemical may be saved. For dusting, the powdered sodium fluoride can be mixed with three or four times its bulk with flour or talc. This is applied with a dusting-can or shaker and the feathers of the bird are ruffled as this is being done. Dusting involves some wastage of the material and is not so efficient as the pinch method. In addition, the excess material in the air is irritating to the bird and operator both. A mixture of equal parts of sodium fluosilicate and country tobacco-snuff has also been reported to give satisfactory results.

Dipping: If the number of birds is sufficiently large, the affected birds should be dipped in sodium fluoride solution. Dipping is rapidly becoming a standard method of treatment favoured by a majority of poultry-men who have overcome the prejudice against wetting their birds. The solution should be prepared in a wooden tub by dissolving sodium fluoride in tepid water, one ounce to one gallon. Dip

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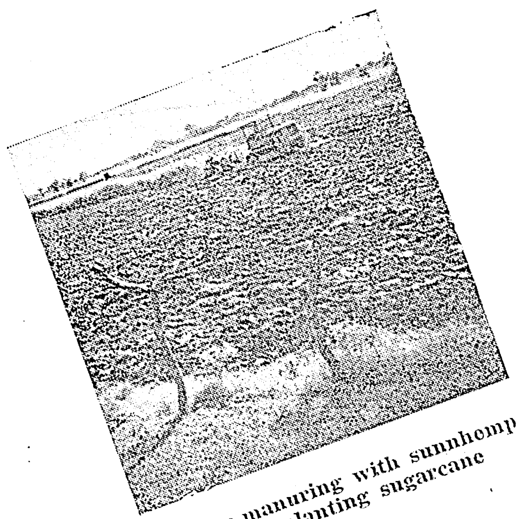
A flock of healthy birds

Sugarcane



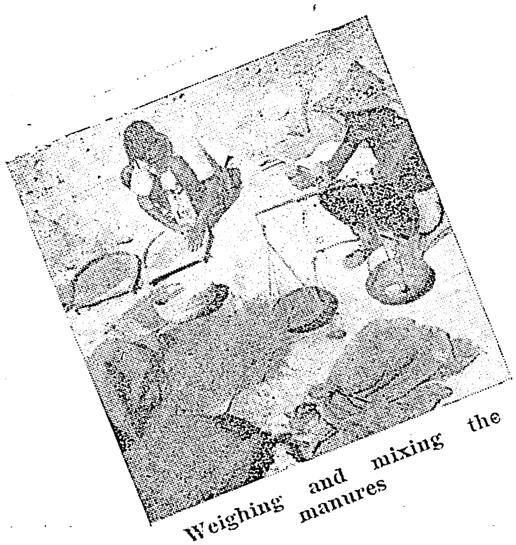
Green-manuring with sunnhemp before planting sugarcane

By M. P. GUHA

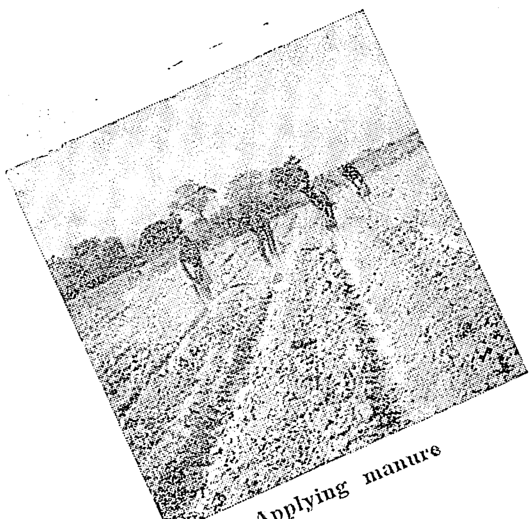
IN West Bengal, the rainfall is not evenly distributed over the whole year. The main sugarcane-growing areas, therefore, need irrigation. This problem has been solved to some extent by the Mor and Damodar Valley Projects and other minor irrigation projects, which have enabled cultivators in the areas served by them to grow two crops instead of one. The irrigation facilities have also enabled cultivators to take to cash crops like sugarcane.

The usual dose of manures for sugarcane used in West Bengal is 100 maunds of cow-dung, four maunds of ammonium sulphate, six maunds of oilcake and four maunds of superphosphate, the last one being not necessary everywhere. In this way, a high yield of over 2,000 maunds of cane per acre has been obtained.

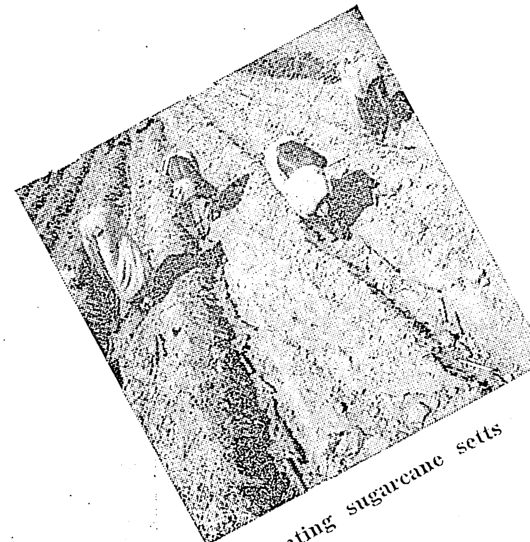
West Bengal is mainly a *gur*-producing area with only one sugar mill functioning in the Nadia district. However, calculated on the basis of a *per capita*-consumption of 15.5 lb. of *gur* in West Bengal, a deficit of 1,15,279 tons of *gur* in the State has still to be made up. Because of the prime need for



Weighing and mixing the manures



Applying manure



Planting sugarcane setts

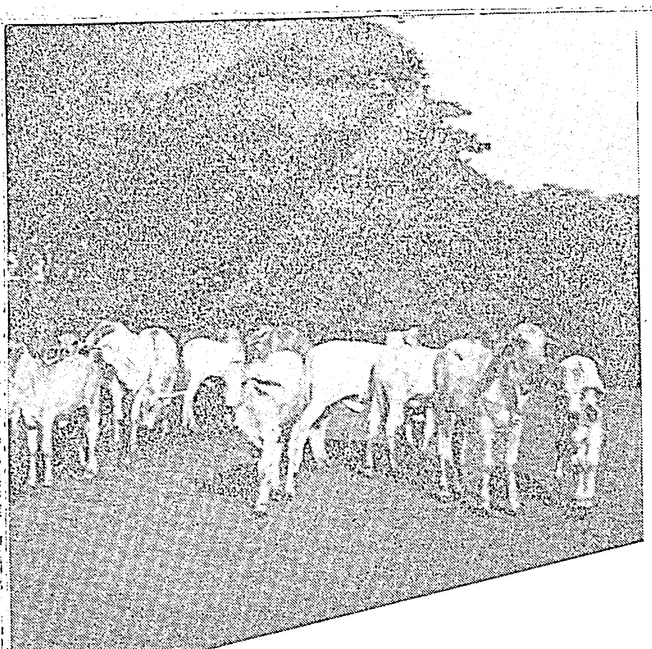
in West Bengal

C.O.527 at Palia (Nadia)

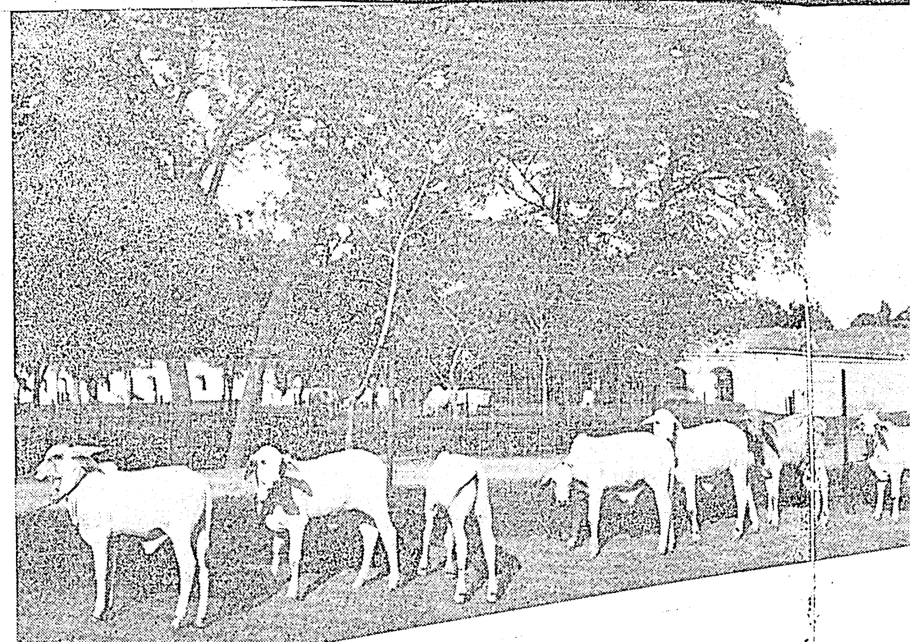
C.O.453 at Saktipur; note the height and tillering

producing foodgrains, only restricted but intensive cultivation of sugarcane is practised. And this has been possible because of the abundant supply of fertilizer now obtainable from Sindri. Activities for pushing up sugarcane cultivation at present are, however, concentrated around the sugar-mill area where the cultivators are being induced to take to agronomic practices.

Efforts are also being made to breed a high-yielding early variety suitable to this area. Manurial trials are also in progress on the State Farms at Chinsurah, Berhampore and Burdwan. The cultivators are gradually realizing the value of improved Coimbatore varieties and are increasingly taking to these. Demonstrations are frequently arranged on cultivators' fields to popularize recommended varieties.



Calves aged three months



Calves aged four months

Calf-

By
J. D. SAMPATH KUMARAN,
Government of India Cattle Farm, Karnal

THE economic improvement of a dairy herd could be speeded up by raising dairy calves for the purpose of replacements of the female stock and for the supply of pedigreed young bulls. Generally 20 to 30 per cent of the milking herd must be replaced each year, if the original strength of the herd is to be maintained without making purchases from outside.

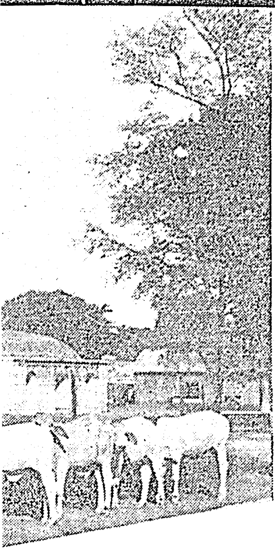
When suitable nutritional and environmental conditions are provided there is no limit to intensive production. On the contrary, poor feeding, care and management, either as a calf or as a cow, may prevent a cow from producing a progeny commensurate with her inherited ability. Success depends to a great extent upon the careful raising of dairy calves. The period from birth to the age of calving is a non-productive period with no income to the breeder. In order to develop a superior dairy herd, a careful selection of calves from high-producing cows and families having the desired qualities should be made.

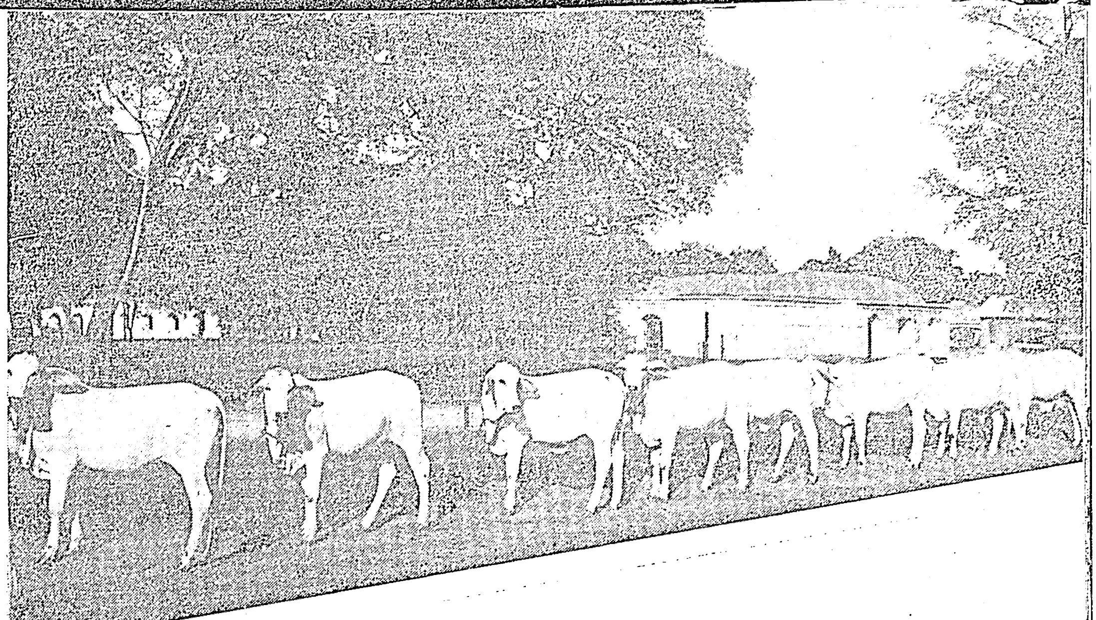
CARE OF THE PREGNANT COW

The problem of raising calves begins with the pregnant cow. The dry period of a pregnant cow should be about 60 days. Adequate rest should be provided to the pregnant cow to get a better flush and more milk. Cows can be easily dried by simply withholding their ration and by increasing the interval between milking. During the dry period a cow has to make up the loss of her previous lactation, to meet the nutritional requirements of the growing foetus, and keep in store sufficient body-reserves for the subsequent lactation.

Poor condition at the calving-time lowers the milk production and affects adversely the health of the new-born calf. It also interferes with the normal

Feeding time—calves aged one month





Calves aged six months

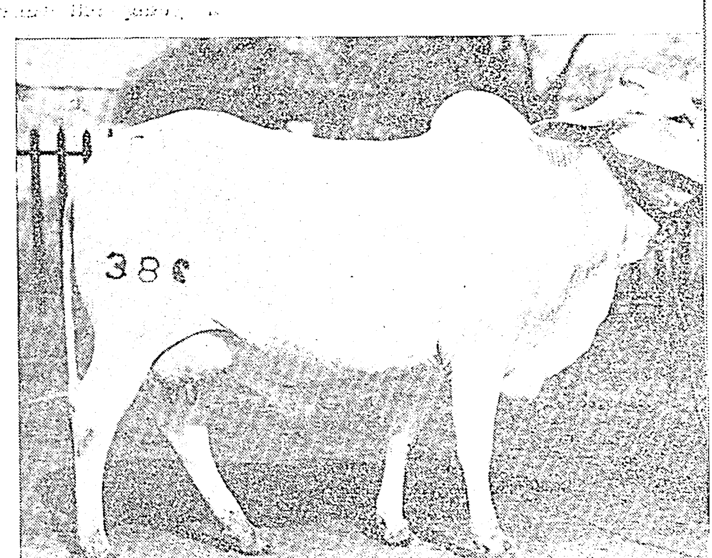
Raising

act of parturition and as a result reproductive disorders usually set in. The dry, pregnant cows should, therefore, be fed with liberal quantities of succulent fodder. A combination of the legume hay such as berseem and a concentrate mixture containing wheat bran, oilcake and gram, not only supplies a good quantity of minerals but also of vitamin D which helps in the assimilation of these minerals. As a general rule, three to six pounds of a concentrate mixture with adequate quantities of hay and succulent feed per day should be given.

CARE OF THE NEW-BORN CALF

Before birth, the young animal is fairly well-protected from shock, injury and infection. It has a practically uniform temperature and under normal conditions its nutritional requirements are met adequately. But once a calf is born, it is surrounded by infectious organisms, variations in temperature and the possibility of inadequate or improper feeding. The danger is greatest at birth, or shortly afterwards. The first 10 days are the most critical period. After six months the task of raising calves is comparatively easy.

As soon as the calf is born, the mucous should be wiped off from its mouth and nostrils with a clean napkin. It is necessary to slap its chest vigorously in order to help the calf to start its respiratory activity, if it is not already respiring. The entire body of the calf should be rubbed dry. Infection may gain entrance into the body of the calf through the navel. It is, therefore, necessary to dip the cord in tincture



Pregnant heifer

of iodine. It is not necessary to cut the cord. If a calf cannot get up within an hour after birth it should be assisted to do so. In the cold weather the new-born calf should be covered with a blanket.

Colostrum or the first milk is rich in antibodies, which are essential for giving protection against infection as well as to encourage the formation of certain blood constituents in the calf. Colostrum has laxative properties and is, therefore, helpful for the first faecal excretions. Colostrum is also rich in vitamins A and D, and nicotinic acid which are essential for the well-being of the calf. Nature has provided for the infant calf colostrum which serves its various needs. The digestive process in the rumen, which is characterized by the development of certain micro-organisms, begins to function after the tenth day of birth.

The natural feed for the calf is its mother's milk. The animals suckled by the mothers grow best and have sleek coats. In large dairy farms it is difficult to feed calves in this manner. By weaning the calves, the cow could be completely milked which would tend to produce a better lactation yield. The young calves could be fed in accordance with their individual requirements. Calves should be fed eight to ten per cent of their body-weight per day.

The attendant should first wash his hands and dip a few of the fingers into a bucket containing milk. The fingers are then inserted into the mouth of the calf which begins to suck the fingers. This process is repeated for feeding the calf. The first feed should be about one pound. At first, there will be some difficulty for the calf to suck the milk but it will get accustomed to it in due course. After the feed a few pinches of common salt should be placed in the mouth of the calf. The mouth and nostrils should be cleaned with a napkin. The hand-feeding should be continued for about four weeks and after that the calf will be able to drink the milk from the bucket without assistance.

In this way, the calf-in-nursing takes milk slowly and mixes it well with its saliva. If the calf is allowed to drink rapidly, it will expand the oesophagus and there is the possibility of the milk getting into the rumen and not going direct into the fourth stomach as intended. When milk gets into the rumen of the calf it will cause undesirable fermentation and would result in unthrifty pot-bellied condition. The young calf has no power for regurgitation.

At an early age the digestive system of the calf is delicate and the capacity of the stomach limited. It differs from that of the adult in the size of different parts; the rumen occupies 80 per cent of the total capacity of the stomach in the adult whereas in the calf the abomasum and the omasum are twice as large as the rumen and reticulum combined. These proportions rapidly change with the advancement of age and when about one year old, the different parts attain the proportions found in mature animals. The fourth stomach of a young calf has a capacity of less than one gallon whereas the mature animal has a capacity of 30 to 70 gallons.

Calves should preferably be fed thrice a day until they are one month old. The interval between feeds should be uniformly maintained. The total amount of the feed should be equally divided among the number of feeds given. The number of times should be reduced to two when the calves are one month old.

The milk for feeding calves should be at the temperature of 95° to 105° F. It is desirable to use a thermometer to determine the temperature of milk as the use of the fingers for this purpose is not very dependable. Sweet and clean milk should be fed as sour or stale milk tends to induce scouring in the young animals. Clean vessels should be used for feeding purposes. A plentiful supply of pure and clean water should be available for the calves at all times. Blocks of salt should be placed in the calf-yard within easy reach of the calves to enable them to lick these whenever they like.

Calves fed as per Table I, mature earlier, and they calve for the first time at 30 months of age, whereas the general average for the Indian breeds of cows to calve for the first time is about 42 months. Intensive production in the form of high fertility and early maturity is dependent on the nutritive level and other environmental conditions.

A young bull raised at the Karnal farm

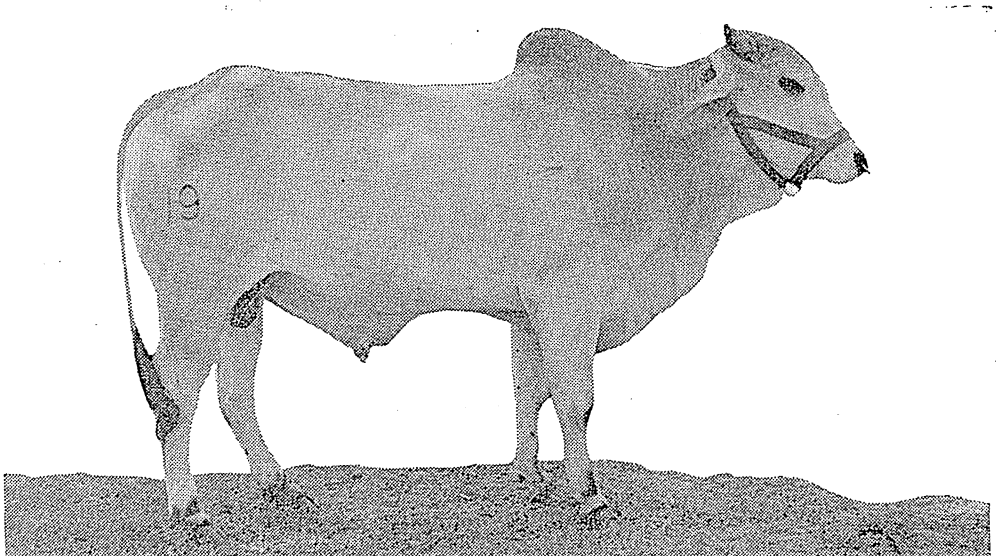


TABLE I

CALF-FEEDING

Calf-rearing on the Standardised Milk 3.5 per cent Fat and Grain.

Age		Milk for female calf	Milk for male calf	Barley water	Grain and Fodder		
					Grain	Green	Dry
1st	week	1/10 of the weight at birth	1/10 of the weight at birth	..	..	..	..
2nd	,,	1 lb.	1 lb.	..	..	..	..
3rd	,,	1½ ,,	1½ ,,	..	..	..	..
4th	,,	2 ,,	2 ,,	..	..	..	..
5th	,,	3 ,,	3 ,,	..	..	..	..
6th	,,	3½ ,,	3½ ,,	¼ lb.	¼ lb.	..	..
7th	,,	4 ,,	4 ,,	¼ ,,	¼ ,,	..	..
8th	,,	4 ,,	4 ,,	½ ,,	¼ ,,	..	..
3rd	month	10 lb.	8 lb.	¾ ,,	1½ ,,	5 lb.	2 lb.
4th	,,	8 ,,	7 ,,	1½ ,,	1½ ,,	5 ,,	2 ,,
5th	,,	6 ,,	5 ,,	2 ,,	2½ ,,	5 ,,	2 ,,
6th	,,	5 ,,	2 ,,	2 ,,	3 ,,	5 ,,	2 ,,
7th	,,	3 ,,		2 ,,	3 ,,	5 ,,	2 ,,
8th	,,	2 ,,		2 ,,	3 ,,	5 ,,	2 ,,

TABLE II

Growth and average daily gain

Age	Male calf	Female calf	Daily gain	
			Male calf	Female calf
8 weeks	96.8 lb.	88.6 lb.	1.0 lb.	0.9 lb.
12 ,,	124.7 ,,	116.6 ,,	1.2 ,,	1.1 ,,
16 ,,	156.0 ,,	147.1 ,,	1.6 ,,	1.1 ,,
20 ,,	188.8 ,,	179.3 ,,	1.2 ,,	1.4 ,,
24 ,,	223.1 ,,	212.3 ,,	1.4 ,,	1.3 ,,
28 ,,	239.9 ,,	250.5 ,,	1.1 ,,	1.4 ,,
32 ,,	....	285.3 ,,	..	1.1 ,,

ell peppers constitute the mangoes of commerce in Europe and America; the large podded, squarish, subtruncate sweet fruits are used for salad, stuffing and baking

Production of Chillies

By S. S. PUREWAL,
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THE word 'chilli' is Spanish for any kind of pepper, but in India the use of this term is limited to the pungent varieties mostly used after drying as a condiment or spice for culinary preparations. The mild type used for salads, pickles, baking and stuffing is known as pepper, or white pepper of commerce, both of which are derived from the berries of a tropical woody plant, *Piper nigrum,* whereas chilli, *Capsicum frutescens* belongs to the family Solanacee.

The native home of the chilli is considered to be tropical South America, especially Brazil, where it still abounds in a wild state. The chillies were not known in Europe until the discovery of America from where the pungent types were first brought to Europe by Columbus. The plant is not indigenous to India. There is no Sanskrit, Hebrew or Chinese name for it. Its introduction into India is believed to be through the Portuguese. At present the chillies are indispensable and a common ingredient of South Indian dietary and an important condiment throughout the country. Prior to its introduction black pepper was used to incorporate the necessary pungency to the condiments and food preparations.

IMPORTANCE

In spite of its recent introduction, the chilli has become an important crop, grown all over India not only for a huge home market but also for export to other countries. It is extensively grown in the States of Madras, Hyderabad, Bombay and Bihar, covering an area of about ten lakh acres annually. Nearly a lakh maunds are annually exported from India to Ceylon, United Kingdom, Aden, Bahrein Islands, South Africa, Zanzibar and Pemba, Mauritius, Australia, New Zealand and Maskat. About 90 per cent of the total exports of this condiment is directed to Ceylon. It increases the taste of food thus making it more palatable, and is even said to improve digestion when taken in small quantities. But excessive use may cause bowel troubles, such as piles. Curry powder is made by grinding roasted dry chillies with other condiments like coriander, onion and turmeric. The pungency of the chilli is due to capsaicin, an alcohol-soluble alkaloid present in the inner walls of the fruit, the hulls and seeds having almost none till the late stage. The quantity of capsaicin present is considered to be inversely proportional to the size of the fruit, being maximum in the smallest. Capsaicin has many pharmacopoeial uses. The chillies, especially when green, are an important source of vitamin C.

CLIMATIC REQUIREMENTS

The chilli plant requires a warm and humid climate for its best growth and dry weather during the maturation of its fruits. The natural habitat of the chilli plant are the tropical and sub-tropical regions, but it has a wide range of adaptability and can withstand heat and moderate cold to some extent, although freezing temperature usually kills the plant. The crop can be grown over a wide range of elevations from sea level up to an altitude of nearly 7,000 ft. The crop is mostly raised under rain-fed conditions where the rainfall varies from 25 to 50 inches, but excessive rains bring about defoliation of its plants.

SOWING TIME AND SEED RATE

The crop can be sown almost all the year round where winters are mild and monsoon rains are not very heavy. But for early crop production where winters are severe, the seed is sown in the nursery-bed during the month of November and the seedlings are over-wintered by providing some sort of wind-breaks held in a slanting position facing towards the south. These seedlings are transplanted in the open field as soon as the season warms up and the danger of frost is over. In northern India in the States of the Punjab, P.E.P.S.U., Uttar Pradesh, Delhi and Rajasthan, where irrigation facilities are available, the first sowing is done as soon as

the season warms up during the month of March. For production under rain-fed conditions, the seed is sown in the nursery-bed about six weeks before the setting in of the monsoon, and transplanting is done with the outbreak of the monsoon, i.e. from the end of June to August. In the Gangetic plains it is a cold weather crop and is sown after the monsoons are over. The seeds are sown in the nursery-bed from the month of April to July. Hot-weather crop is sown during the month of February. In the southern States like Bombay where the season is mild, the main crop is sown from May to October. In the South, the main crop is rain-fed and the seeds are sown in the nursery-bed during the months of May-June and transplanting is done by the middle or the end of July.

The Bell Pepper is sown during the summer months of April to June, in the hills for its green fruits that are supplied to the markets in the plains. It can be produced successfully in the plains during the early summer or early winter months.

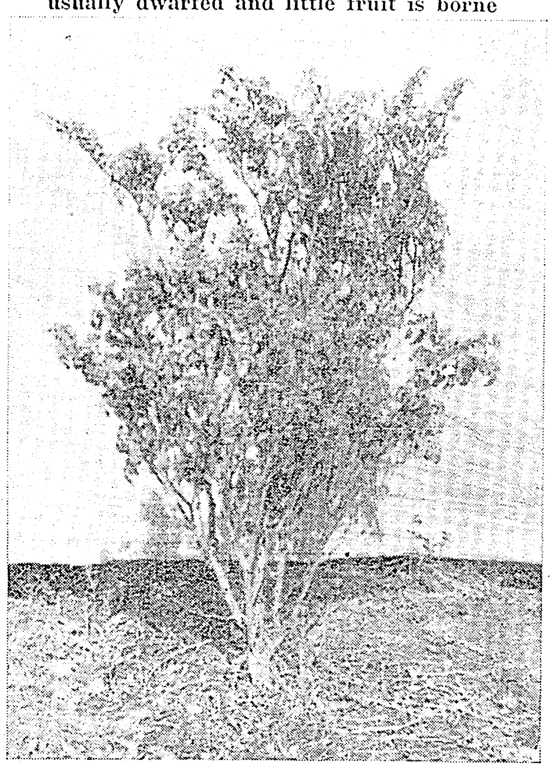
A typical scene in chilli market; open, free from shade and hard ground is used for drying and curing chillies. The woman in the fore-ground is sorting defective fruits and the man on the extreme right is trampling the half-dried fruits

The chilli seed is very light and counts about four thousand seeds per ounce, and is viable for two to three years. A good-quality seed gives a germination of 80 to 90 per cent and the seedlings raised from 1-1½ lb. of seed are sufficient to plant an acre. When the crop is sown in the field directly from the seed, three to four pounds of seed will be sufficient to sow an acre.

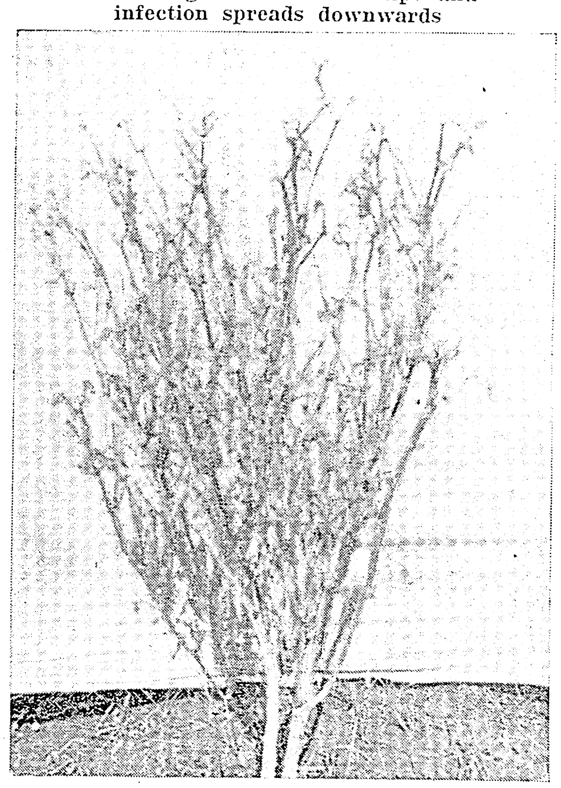
SOIL AND ITS PREPARATION

The chillies can be grown on almost every kind of soil rich in plant nutrients and well-supplied with humus. Clay loam, heavy silt

A virus-infected plant with curled leaves; plants that become infected while young are usually dwarfed and little fruit is borne



A die-back-infected, defoliated plant; the shoots begin to die from tips and infection spreads downwards



and silt loams are, however, considered to be the most suitable for obtaining high yields. For the rainy season crop, heavy, well-drained soils which retain moisture but are not susceptible to water-logging, should be selected. The crop can also be successfully raised on the sandy loams provided manuring is done heavily and irrigation is applied adequately.

The chilli plant has a tap-root that may penetrate into the soil upto 24 inches or more. Hence a deep seed bed is required for successful crop-raising. As soon as the preceding crop is removed, the stubble should be ploughed-in with a furrow-turning plough. The land is ploughed five to six times with an ordinary plough and planked smooth before preparing the seed bed. Well-rotted farmyard manure is added after the first deep ploughing in order that it gets mixed thoroughly with the soil during the subsequent ploughings.

MANURES AND FERTILIZERS

Twenty to thrity cartloads (20 tons) of farmyard manure or compost are required to be added to an acre. The manure should be thoroughly decomposed as fresh manure aggravates the attack of white ants, a serious pest of chillies. In order to reduce the severity of the white ant attack, it is advisable to apply the manure to the preceding crop. The application of sheep-manure is preferred in certain localities and, therefore, sheep should be penned in the field where a chilli crop is to be raised. Fertilizers, especially the nitrogenous ones, increase the fruit yields. Sulphate of ammonia may be applied as a top-dressing at the rate of two to three maunds (164-246 lb.) per acre when the plants have taken roots and are well-established in the field after transplanting. A later doze, four to six maunds per acre, should be given at the time of flowering. Superphosphate at the rate of two to three maunds (164-246 lb.) per acre may be drilled with advantage at the time of transplanting in case the crop is to be grown on sandy loam and loam soils.

VARIETIES

There are many varieties of the pungent types of chillies varying mainly in shape, size and pungency. The fruits when unripe are usually green although types with cream, greenish-yellow, yellowish-orange, purple or purplish-black raw fruits are also met with; in fact, these are the intermediate colour stages from the unripe to the ripe fruits that are generally red or yellow or orange in colour. Long Red, Cayenne, Tobasco, Sunward or Surajmukhi or Suryamukhi, Dhanni, Beguni, Kamranga, Red Cluster, Yellow Sirhandi and Sanauri are some of the pungent types listed by the seed merchants. Improvement work on chillies has been done by the Agricultural Departments in the States of Madras, Bombay, Bihar and the Indian Agricultural Research Institute, New Delhi. The improved types N.P. 46 and 390 are said to be fairly resistant to thrips. For dry chillies, the varieties the fruits of which have few seeds, firm stalk, thin pericarp, bright red colour, glossy appearance and high pungency are more popular with the growers as these fetch a high price in the market. There is a great variation in the size of the fruits—from a small, round or conical pea-seed-sized fruit to about six inches long. Although the pungency is considered to be inversely proportional to the size, the long-fruited types are more popular.

Of the mild or sweet types Bell Pepper, Rubi King, Chinese Giant, Elephant Trunk, Bull Nose, California Wonder and World Beater are some of the better known types.

METHOD OF SOWING

The chilli seeds are either sown directly in the field or they are first sown in the nursery-bed to raise seedlings for transplanting at a later date. When the crop is sown directly in the field, the seed is sown on ridges two to three feet apart and nine inches high. The seed should be sown in lumps of six to seven seeds about $\frac{1}{4}$ in. to $\frac{1}{2}$ in., in ridges eight to nine inches apart, as the seedlings come through the surface better in a group than when they are sown thinly. The first irrigation is given immediately after sowing taking care not to submerge the ridges to avoid hard crust formation and consequent obstruction to the germinating seedlings. The second irrigation may be given four to five days after the first one. The seeds germinate after about a week.

For raising seedlings the seed is sown in a heavily-manured and well-prepared nursery-bed which has been laid out in small plots convenient for irrigation and weeding without entering the plot. The seed is sown about six weeks before the transplanting time, and in this way it is possible to get the seedlings earlier under controlled conditions in order to raise an early crop. The nursery seed bed is prepared in a sandy loam soil well-supplied with humus. The level of the nursery plot should be at least six inches higher than the ground level. The soil should be sterilized with formaldehyde or steam. Two inches of leaf-mould or compost manure should be mixed in the top-soil of the bed and the soil should be worked to a good tilth before putting in the seed. The seed is lightly covered with a $\frac{1}{4}$ in. layer of manure. The seed-bed is irrigated immediately after sowing using a fine spray from a sprinkling can. The nursery-bed is watered every day till the seeds germinate, and watering is so arranged that the bed is kept just moist and not too wet.

Black ants carry away seeds and do a lot of damage to the germinating seedlings. These should be effectively controlled by dusting gammexane (B.H.C. five per cent) on the boundaries of the nursery bed. An area of 800-1,000 square feet is required to sow $1\frac{1}{2}$ lb. of seed to raise enough seedlings for an acre. The seed germinates after six to ten days of sowing depending upon the temperature, and the seedlings when six to nine inches high, usually within a period of four to six weeks, are ready for transplanting. To raise vigorous seedlings ammonium sulphate solution (one ounce in one gallon) should be applied when the seedlings are about two inches high and again after a couple of weeks. Over-crowding and excessive watering should always be avoided. The transplanting should always be done in the evening followed by watering where irrigation facilities are available. Under rain-fed conditions the transplanting is usually done before or after the rains, but it is advisable to do the transplanting when the rains are expected and the plants, after setting, should

be watered with the sprinkling can to avoid heavy mortality.

IRRIGATION AND WEED-CONTROL

Frequent waterings are required to be given to the early crop during hot, dry weather and irrigation should be given every 4th or 5th day. During the winter months, irrigations may be given once in every two weeks or so. Weeding is very essential especially of the rainy season crop. The weeds should never be allowed to compete with the plants and should be removed before they overpower the crop. Weeding may be done as frequently as required but cultivation beyond that necessary for weed-control may do more harm than good, especially if practised late and comparatively deep after the plants are well-established. In all, three to four weedings during the early stages are sufficient.

HARVESTING

The country types are mainly grown for ripe fruits, but from the early sowings, the first flushes of fruits are usually plucked green to stimulate further flushes of flowering and fruit-setting. The first picking is done about two months after transplanting. The subsequent pickings are done when the fruits are fully ripe and change from green to red or yellow or orange in colour and are still plump and glossy in appearance. The plucking is done with hands. The fruits along with the peduncle are severed gently from the plants and are gathered in baskets by the pickers.

The crop continues to flower and fruit till the onset of winter and plucking of fruits continues till December. In the South, pickings may go on up to the end of February. Usually the fruits are picked fortnightly and in all six to ten pickings are done.

The mild types come to flower after about 1½ months of transplanting. The fruits are fully developed within a month's time and should be plucked before they begin to change colour. More frequent pickings are to be done in the case of the mild types than in case of country types.

YIELD

The yield of undried ripe fruits varies greatly with the condition of the crop. The average yield under rain-fed conditions varies from 250-1,000 lb. per acre and for irrigated crop from 1,500-2,500 lb. per acre, but yields as high as 6,500 lb. per acre are not uncommon. The proportion of dry to fresh-ripe chillies varies from 25 to 40 per cent depending upon quantity of seeds and the thickness of the inner wall or the pericarp of the fruit.

MARKETING AND STORAGE

The growers usually sell their produce in the fresh condition soon after picking. The plucking is done when the fruits are fully ripe. It is, therefore, advisable to take the produce immediately to the market before the fruits lose their bright colour and glossy appearance. Moreover, the loss in storage due to evaporation will also be considerable. In some parts of the country, the produce is smeared with *mohua* oil (Madhuca longifolia) to impart glossiness. The produce is dried in the markets by spreading it over the drying floors or roofs of houses. The heaps are spread in thin layers and frequent stirrings are given during the day time so that the drying is uniform and there is no discolouration or mould growth. The drying fruits are heaped in the evening and covered with tarpaulin or gunny bags and are spread again in the morning till the fruits are almost completely dry. When half-dried they may be slightly trampled over to flatten the fruits to facilitate drying and packing in gunny bags. The dried chillies are marketed in bags whereas the fresh produce is taken to the markets in baskets, bags or carts. The fresh produce should not be heaped for any considerable length of time to avoid the rotting of fruits. The mild types should be taken immediately to the market without exposing them to the sun. They are always carried to the market in baskets. Slightly under-ripe chillies can be ripened artificially by stacking them indoors for two to three days when the fruits will develop full ripe colour. The best temperature for ripening is 71° F to 77° F.

DISEASES AND INSECT PESTS

By far the most serious disease of the chillies is the leaf-curl or mosaic caused by a virus. It is characterized by the curling of margins of leaves inwards or up-

(*Contd. on page 32*)

FIGHTING FAMINE AND DROUGHT BY SIMPLE MEANS

(*Contd. from page 11*)

TIMELY TILLAGE

The fields should be immediately ploughed-up after harvesting the *rabi*-crop with a soil-turning plough. This practice should be regularly followed, say once in a month, by using a *desi* plough or some other light plough during the summer months when the land is generally kept fallow. During the rains, the fields should invariably be covered with crops, preferably green-manuring legumes. One of the most effective measures for fighting famine is to cultivate hundreds of acres of the fallows at present maintained in villages, and grow quick-maturing legumes in them, viz. Moong T1 or Lobia T1. These crops generally flourish even under scanty moisture conditions and produce valuable food and at the same time add to soil fertility. The monsoon fallows, on the other hand, produce nothing but require several ploughings and keep the farmer and his bullocks engaged unnecessarily. These legume crops ripen by the end of August when they should be immediately ploughed-up into the soil after picking the ripe pods. Turning-in of these legume crops into the soil should, under all circumstances, be carried out at the latest by 7 September, even if the cultivator has to lose some unripe pods. Late ploughing-in of the green-manure crops depresses the yield of the following *rabi* crops and thus results in heavy losses to the cultivator.

Ploughing of the fields, particularly the last ploughing, should be carried out across the slope and along the contours of the land instead of cutting furrows up and down the slope or hill-sides. This will help the rain-water to soak into the ground and get conserved.

PROPER AND TIMELY APPLICATION OF MANURES

The application of organic matter and manures to the soil is also a very important practice to fight drought. Their application increases water-retentive capacity of the soil and helps conserve moisture.

The ploughed land should receive at least five to ten cartloads of farmyard manure or compost per acre. The application of manure should be carried out before the start of the monsoon and should be immediately followed by ploughing.

Application of superphosphate, say at the rate of 40 lb. P_2O_5 per acre, also gives encouraging results. Superphosphate in no case should be applied on the surface but about three to four inches below the surface layer of the soil by means of a furrower or a seed-spout fitted behind a *desi* plough.

SUITABLE ROTATIONS, VARIETIES OF CROPS AND FRUIT CROPS

The crops or varieties which are resistant to drought should be grown. For *kharif,* such crops are *jowar, bajra,* Moong T1, maize and *arhar,* and for *rabi,* gram, barley, *duan* (*tara mira*), etc. Wheat can only be grown successfully if adequate rains are received in August and September and the soil is capable of retaining moisture. There are certain varieties of paddy in the eastern districts, viz. Satha, Bagari white and Bagari black, which require comparatively less moisture as compared to other varie-

(*Contd. on page 29*)

COMPARATIVE PERFORMANCE OF SOME OF THE NON-LEGUME FORAGES IN THE PUNJAB

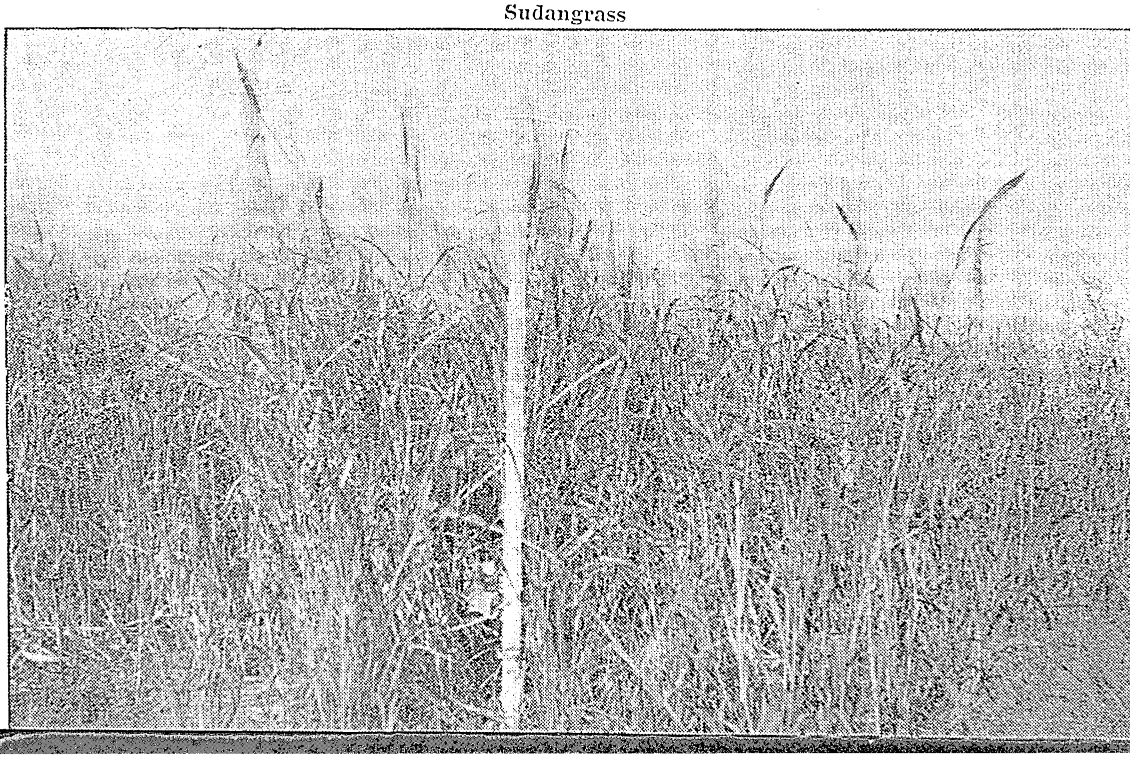
By H. C. MALIK,
Assistant Economic Botanist (Fodder), Sirsa

THE period from April to June is not only the hottest and the driest period during the whole year but is most important from the farmer's point of view for carrying out the various agricultural operations. He has to harvest the crops like wheat, gram, barley, berseem and lucerne and complete their threshing and cleaning prior to the advent of the monsoon season. He has also to undertake sowing of cotton, etc. during this period. It is, therefore, apparent that his working cattle are put to a very great strain at this time. Besides, the yield of milch cattle, especially the buffaloes, decreases considerably due to severity of heat and lack of green forage. Berseem, the ideal winter forage, is almost over. Even if it sprouts and gives a cutting at this time, its quantity and quality are both greatly reduced. Other forages like late-maturing oats remain green to some extent up to early April after which they dry and do not provide superior quality forage. In view of this, any crop which provides green fodder at this period is of great significance.

There are a number of crops which would grow and provide green forage at this period, for example, sorghum (*jowar*) and *bajra* from the existing crops and Sudangrass and Teosinte from the new introductions. Sudangrass is a summer annual which grows rapidly, and even in dry season there is more certainty of getting a crop from it than from any other forage. It can tolerate long hot and dry periods of weather and is particularly suited to the arid conditions. Sorghum and millets (*bajra*) are crops that would tolerate and grow under these conditions but with slight variation. In fact, sorghum is the most dependable forage in the main *kharif* season from July to September. It is productive even under low rainfall conditions and is superior to all the other forage crops in the Punjab State. *Bajra* excels sorghum in drought resistance, but is grown primarily as a grain crop, the by-product of which only is utilized as cattle roughage, as its green forage is not so palatable. Teosinte (locally known as *makchari*) is another coarse annual, suitable for growing in the summer season. It grows 3-12 ft. high, and unlike maize it tillers profusely. It is closely related to corn but requires a rich soil and a long season of moist hot weather for its best development. If cut at the young stage, i.e. when 4-5 ft. high, it gives two cuttings of forage in the season.

All these crops can give more than one cutting of green forage under favourable conditions of soil and irrigation. Sudangrass is

Sudangrass



quick-growing and gets ready for harvesting for the first cutting in about 50 days after sowing, and later on after about 30 to 40 days, giving two to three good cuttings in the season. *Jowar* is next in order of growth to become ready in about 70 days after sowing. It usually remains stunted in growth and gives one cutting of green forage, but an early-sown crop may give another cutting with adequate supply of irrigation and rain. Teosinte grows slowly and its growth is generally stunted to start with in this period, but it makes a luxuriant vegetative growth later during the rains.

EXPERIMENTS AND RESULTS

An experiment to study the comparative performance of these non-legumes, viz. Sudangrass, *jowar* and Teosinte, primarily for the early *kharif* season, was started in 1947-48. *Bajra* was also included in the next two years, viz. 1948-49 and 1949-50, because of its very quick growth and high drought-resistant quality, though the quality of its green forage is much inferior to the three crops mentioned above.

The trials were laid according to the randomized system of field trials for a period of three years on a well-prepared soil using the usual seed rate of about 10, 15 and 20 seers per acre, respectively. Seed rate of *bajra* in these tests was about 2.5 seers per acre.

There was great variation in the forage yield of the crops under comparison, not only amongst themselves but also from year to year. In the case of crops sown very early in the *kharif* season, i.e. in the middle of March on 14-3-47 in 1947-48, Sudangrass gave the highest total forage of 804.7 maunds per acre in three cuttings taken during the season up to the beginning of November. *Jowar* gave only one cutting, yielding only 307.7 maunds of forage per acre. Teosinte gave 608.8 maunds per acre in two cuttings up to November.

When crops were sown in April on 8-4-48, two cuttings were obtained from Sudangrass, *jowar* and *bajra* up to August and one cutting from full-grown Teosinte in July. In this case, the highest forage yields were secured from *sorghums*, giving 994.6 maunds per acre, followed by *bajra* giving 894.7 maunds per acre and Sudangrass, 622.4 maunds per acre. Out-turn of Teosinte in one cutting was 836.7 maunds per acre. Yields were very high in all cases as the crops grew during the monsoon season.

During 1949-50 the sowing was possible on 4-5-49. The crops made a luxuriant vegetative growth because of the increase in humidity due to monsoons during their growth period. In this case, *jowar* was superior to other non-legumes, giving 858.3 maunds of forage per acre, followed by *bajra* yielding 794.4 maunds per acre in two cuttings up to August-September. Sudangrass gave two cuttings up to August and yielded 764.4 maunds per acre. Teosinte yielded 729 maunds in one cutting in July when it had completed its growth.

If the period of growth of each crop is taken into consideration, it will be observed that Sudangrass was ready for harvest first of all, followed by sorghum, *bajra* and Teosinte, respectively. Sudangrass made a quicker growth than the other non-legumes in the dry and hot conditions that prevailed prior to the advent of monsoons. *Jowar*, *bajra* and Teosinte grew well but invariably their leaves showed signs of drying at this stage. *Jowar* and *bajra* recovered well but Teosinte, on account of its slow growth, could not give high forage returns unless allowed to grow till the rains were received.

It is, therefore, in the interest of the farmer to make use of Sudangrass for providing green forage in the dry and hot period prior to the advent of rains, but later on sorghums and Teosinte will grow quite well and yield high tonnage of green stuff. As regards quality of forage, sweet sorghum was superior to the other non-legumes but Sudangrass and Teosinte were preferred to *bajra* by cattle.

MAN OF THE MONTH (*Contd. from page 6*)

and 25 respectively, a pair of hard working young farmers, who lend support to all the progressive actions taken by him. Self-taught and hard working, this farmer knows that it pays to be cooperative and does not ignore the ideas conveyed to them by the field workers of the Agriculture Department.

THIS IS PROOF POSITIVE !

In a State where soil fertility is questionable and the rainfall problematic, the farmers have to fight the elements all the time and so when they take to new methods, they take to them fully prepared to face the consequences in the case of a failure. The method has not been fully tried by the State Government, especially from the point of view of its economics. There is one reservation made, however. As stated by the State Director of Agriculture, when the experiment was first done near Nadiad by a Gujarat cultivator in summer, about 100 cartloads of farmyard manure per acre was applied. The additional cost of manure and irrigation on account of this excessive dose made the raising of that particular crop uneconomic. However, the residual effects made the succeeding crop highly economic. So far as Bhadabhai is concerned, the dose of manure given by him was moderate. And, because the crop was raised in the *kharif* season, his cost of irrigation was also small. These two factors made his crop very economic.

Mota Gundala is fortunate in having leaders like Bhadabhai. I came away from this village feeling that here is an example in village management and spirit of progressiveness worth emulating!

POULTRY LICE - - (*Contd. from page 13*)

the bird in this solution, holding the wings over the back with one hand and ruffling the feathers with the other when the bird is below the surface of water. Duck the head once or twice, take it out and hold it for a moment on the tub to receive the draining solution and then let it go. One hundred birds will use up approximately five gallons of the dip; sufficient material should be available at the start of operations to maintain the original strength of the dip.

The dip is to be given on warm and sunny days, so that the treated fowls may dry up quickly. Very weak and young birds should not be dipped in cold and damp weather. The dipping method kills all lice immediately but where the chemical is applied as a powder, it requires three to four days for a complete kill. If the birds are caught and handed to the operator, 100 to 125 birds an hour can be treated by dipping or dusting, and approximately 60 to 75 per hour by the "pinch-method". It would be necessary to repeat the control measures after about a week to complete the eradication.

COST OF TREATMENT

Generally, treatment with one of the modern residual insecticides like DDT or BHC will cost approximately six pies per bird. Derris root powder which also gives satisfactory results but has less residual effect will cost slightly more than half an anna. Of all the insecticides, sodium fluoride is the cheapest and the cost per bird by the dipping, dusting and pinch-methods will approximately work out to 1.2 pies, 6 pies and 2 pies, respectively. The cost of all these treatments can still be lowered if the insecticides are obtained in bulk.

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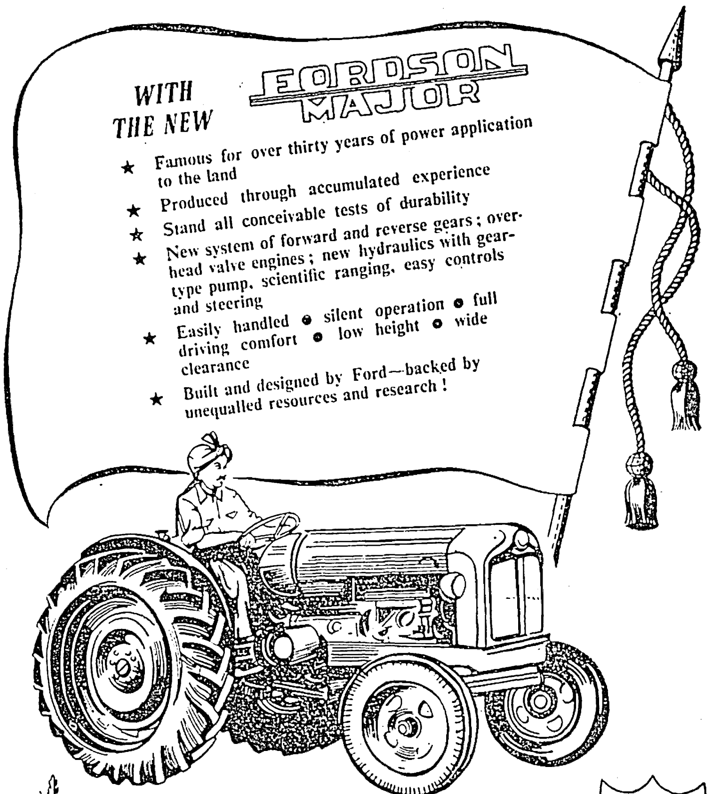

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MAJOR FARMING THAT LEADS IN VALUE

PPS/UP/49

 (Contd. from page 24)

ties of paddy. The area under these varieties of paddy should be increased in the main paddy-growing tracts. Even among the late varieties, early-maturing types, viz. N.105, N22A and Desi Karngi, require less moisture than the more important late varieties. Early varieties of paddy should invariably be sown mixed with *jowar*-seed at the rate of about one seer per acre. If there is abundant moisture and paddy grows well, the *jowar*-plants can be fed to cattle. On the other hand, if paddy suffers from drought for want of moisture, *jowar* will certainly yield a fair quantity of grain to the cultivator.

Care has to be taken in selecting the proper seed. It is important to make sure that the seed to be sown was actually produced and adapted to a dry climate, as the seed produced in humid areas is adversely affected by drought conditions.

Among the suitable crop rotations recommended for such areas are:

Kharif	*Rabi*
Jowar	*Arhar*
Arhar	Groundnut
Arhar	Moong T1
(*Arhar*—groundnut)	Cane
(*Arhar-Moong* T1)	Cane
Arhar	Lobia
(*Arhar-lobia*)	Cane
Bajra	*Arhar*
Jowar or *bajra*	Gram
Moong T1	Wheat
Lobia T1	Wheat

Among these rotations the 2nd, 3rd, 4th, 5th, 6th and 7th are the most important ones. In these rotations, *arhar* is sown in lines nine feet apart. In between the *arhar* rows, groundnut, Moong T1 and *lobia* crops are sown in lines 1½ ft. apart. These intervening crops are all leguminous and of spreading nature. They not only add nitrogen to the soil, but provide enough food and act as a cover for the soil in the rainy season helping to conserve the soil and soil-moisture by preventing loss through surface run-off and evaporation to a considerable extent. Good crops of *arhar*, groundnut, Moong T1 and *lobia* can yield as much as 15 md., 20 md., 10 md., and 15 md. of grain, respectively.

There are certain fruit trees such as *ber* (Zizuphus), *bel*, *amla* and dates which can quite successfully resist dry conditions. Their plantation by individuals or on community basis can provide enough relief in years of scarcity by way of some food as well as some continuous income year by year once the plantations attain full growth.

METHOD OF SOWING

The sowing of crops in areas of low rainfall and drought should generally be done in lines with increased spacing between rows and with a reduced seed rate. The sowing should be done at a depth of three to four inches below the surface so as to ensure that the seed has fallen in a moist ground. The sowing should preferably be carried out by bullock-driven seed-drills or with a *desi* plough having a funnel attached to a hollow bamboo for sowing the seed. This will ensure that the seed falls into a moist layer. A good, healthy seed should always be sown.

For the *kharif* crops like *jowar*, maize and *bajra*, the rows may be 15-18 in. apart and for *rabi* crops like wheat, gram and barley, the distance may be about 9-12 in. Thinning should be carried out in the case of *kharif*-crops when they are about six inches high so as to remove the weaker plants. This will ensure the supply of available moisture to the remaining plants.

By increasing the spacing between the plants and decreasing the seed rate, the plant population per unit area is decreased. Individual plants, therefore, get more space to grow and more area to draw moisture and nutrients. In the case of *jowar*, the optimum condition has been found to be ¾th the normal seed rate and 15 in. spacing between the plants. The sowing should always be carried out across the slope.

Experiments have also proved that ploughing the fields after the first shower with a heavy plough such as Victory or Punjab or U.P., and then sowing in lines followed by periodical interculturing gives better yields than ploughing by the *desi* plough accompanied by broadcast-sowing. The reason of high yields after ploughing with a heavy plough can be attributed to better absorption and retention of moisture of the soil.

PROPER INTERCULTURING

Interculturing is an important operation in fighting deficient moisture conditions. It creates a blanket of loose soil on the surface of the field so as to prevent cracking and loss of moisture by evaporation. It also helps in destroying weeds which compete with the crops for moisture and soil nutrients. Proper and timely interculturing may mean considerable reduction in the water-requirement of crops.

The sowing of crops in lines is a prerequisite to proper interculturing. The intervening space between rows of the crops should be thoroughly hoed with a suitable hoe like the Akola hoe and the cultivator. In the case of *rabi* crops, in which these hoeing implements cannot be used, the lever or triangular harrow may be used in the standing crop till it is five to six inches high. Interculturing with a hoe, harrow or *khurpi* is a very essential practice in fighting drought and should be regularly and properly done after every 10 to 12 days, and also after every shower, as far as possible.

STRIP-CROPPING

The practice of strip-cropping is a very suitable practice for uneven and sloppy areas and consists in growing of erosion-resisting crops as groundnut, Moong T1 and Lobia in narrow strips alternatively with the broader ones of the erosion-permitting main crops such as *bajra* and *jowar*. The erosion-resisting crop acts as a cover for the soil during the rainy season, and thus helps in conserving the soil particles, soil

fertility and soil moisture by preventing loss through run-off to a considerable extent. Such crops sown in strips alternatively with the main crops check the running-off of water of even the heaviest rains, allowing it to spread before it can develop enough momentum to carry away the top-soil.

Suitable contour strips of erosion-resisting crops may even obviate the necessity of bunding in the areas having gentle slopes and widening of the gaps between the bunds in areas having steeper slopes.

CULTIVATION OF SUBSIDIARY CROPS

To ensure food supply in famine areas, it is always advisable to raise heavy-yielding crops and fruits, like potato, sweet potato, tomato, turnip and papaya, which will feed the cultivator's family from comparatively a small portion of his holding, in case the grain crops suffer heavily from drought and there is shortage of cereals.

Though these heavy-yielding crops and fruits cannot altogether replace the cereal diet, they can at least supplement it and thus relieve the pressure on cereals. Small areas near the wells, ponds and tanks can be easily grown with these crops. A few papaya trees, for example, do not require much land and can easily be grown in front of the house, near the well, pond, or tank, or on the corners of fields.

DIGGING AND DEEPENING OF TANKS, PONDS AND RESERVOIRS

No surplus rain-water should be allowed to be drained off to rivers or drains. It should normally be collected in ponds or tanks or reservoirs specially constructed for this purpose. Already existing tanks should be deepened so as to meet an emergency. These tanks can also be utilized profitably for raising crops like *singhara* and rearing of fish.

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Business Manager

HARVESTING AND PREPARATION OF GROUNDNUTS FOR MARKETING IN MADHYA PRADESH

By S. G. KOLTE,
Economic Botanist to Government, Madhya Pradesh

THE importance of groundnuts in the agricultural economy of Madhya Pradesh is very great indeed, for it is both a cash crop as well as a good rotation crop with cotton. It is, therefore, necessary that scientific knowledge about its cultivation and marketing should be spread among the growers so that they may be able to earn maximum profits from its cultivation.

The groundnut is principally grown in the cotton districts of the State. However, small areas are also devoted to it in the wheat and rice tracts. It is primarily a monsoon crop and is grown generally without irrigation. Sowing normally begins towards the end of June or early July. Under normal conditions, the crop gets ready for harvesting in fourteen weeks from the sowing time. This is especially true of the small-seeded varieties, like the Small Japan, AK. 12-24 and Spanish peanut. On lighter soils the last-named variety ripens even a week earlier than the others. The large-podded types, viz. AK. 10 and AK. 8-11 mature ten to fifteen days later. As a general practice, the pods are sold green as soon as they are plucked from the plants which have not reached the stage of full maturity usually indicated by the general yellowing of the foliage and shedding of the lower leaves. The only incentive to this undesirable practice is provided by a slightly higher price ruling in the market in the beginning of the season when the stocks with the crushers are at their lowest. In order to attract large quantities at the beginning of the season they invariably offer a little higher price. But with the increase in supply the price falls almost precipitously and not infrequently to an extent which more than makes up the merchants' loss incurred by them by way of offering a higher price. The cultivators are, therefore, the ultimate losers.

Green pods do not contain more than 40 per cent moisture when produced on heavy or medium soils. They contain even less moisture when produced on lighter soils. But the price offered in the markets for green pods is generally about 50 per cent less than that for completely dry pods. Therefore, ten per cent is lost in value by marketing groundnuts green or in fresh condition.

Deductions at the rate of four to ten pounds per bag of one maund are common for earth, stones, immature pods and lack of clealiness of the produce. This loss from refractions, therefore, exceeds six per cent.

The expenditure on handling and other marketing expenses is doubled; the same could be saved to the grower if the produce were marketed after drying and removing impurities. These expenses reduce the income of the grower in the end.

It is stated that the hurry to sell groundnuts in the green condition is chiefly due to the shortage of money which the cultivators need badly for cotton-picking and other calls. This is only true in part, for a number of well-to-do cultivators sell groundnuts in their fresh condition due to lack of space for drying them and for fear of theft if these are dried in the fields.

The groundnut plants with pods dry rapidly after harvesting if exposed to the afternoon sun. Within five days no less than 30 per cent of the moisture evaporates and then plucking can be done easily. Extra five to seven days' watching in the field itself costs very little to the grower who employs watchmen for a month and a half in the season, as compared to the increased return that he will get by selling the pods dry.

Apart from the monetary losses mentioned above, the harvesting of groundnuts in comparatively green condition does not renovate the soil, as is the chief characteristic of all leguminous crops, because of the reasons given hereafter; and there is no wonder that some of the cultivators complain that groundnut is a soil-exhausting crop. By harvesting earlier than fourteen weeks, the crop does not get time to shed as many of its lower leaves as it does normally and, therefore, the soil is left poorer in organic matter normally obtained from this source. Moreover, the roots and rootlets of the green plants are comparatively stronger and when pulled out, bring with them out of the soil the attached root-nodules which instead of remaining in the soil, as they usually do, are lost to the land in this way. On the other hand, when the plant has matured properly, the rootlets and the nodules attached to them naturally become weak, and with the soil beginning to get dry after the cessation of rains at the proper harvesting time, this valuable treasure of atmospheric nitrogen and its fixers remain in the ground.

By harvesting the groundnuts before maturity, the tops do not make good fodder, as the large percentage of moisture present in the plants is likely to cause excessive fermentation, and unless the harvested plants are frequently turned, these are likely to get spoiled. The groundnut fodder gets spoiled if rains overtake the harvesting operations or follow soon after. Excellent fodder is made from the vines when harvesting is done at the proper time. The fodder is cured green with its characteristic aroma and is highly nutritious for animals who greatly relish it in the summer months.

From the foregoing description it would be seen that lifting of groundnuts early in compa-

ratively green condition before these are fully ripe, is economically unwise and agriculturally fatal. Big purchasers are reluctant to purchase green groundnut pods for fear of possible fermentation in the course of drying and rains overtaking the drying operation in the compounds. This is because the oil obtained from such deteriorated material is dark in colour and rancid, fetching a lower price in the market. The oilcake in this case also sells at a very cheap price.

PRODUCTION OF CHILLIES

(*Contd. from page 23*)

wards and crumpling of intervenous areas. In case of a severe attack the leaves usually fall off as a result of which the plant growth is obstructed and the fruits get truncated or curled at the stylar end. Once the infection gets into the plant it is not possible to eradicate the disease. The disease is usually spread through insect vectors such as thrips, aphids and mites. Therefore, to check the spread of the disease efforts should be made to control the vectors. Spraying with contact-insecticides such as nicotine sulphate solution, 1 : 1000 parts of water, and soap solution, 1 : 40 parts of water, is effective to control thrips and aphids, respectively. Mites may be controlled by dusting the attacked crop with a mixture of sulphur lime in the ratio 1 : 5. Care should be taken to select the fruits from the healthy plants for next year's sowings. Vigorous growth of the plants should be maintained with the application of fertilizers.

The chilli plant is also attacked by fungus diseases such as die-back and anthracnose. The die-back is characterized by the drying-up of the branches from top and spreading gradually downwards. Moist weather, shade and heavy dew are favourable for the spread of the disease. Spraying with Bordeaux mixture is considered to be an effective check to some extent.

Anthracnose attacks young and immature fruits causing them to drop. The fungus permeates the seed-cavity and infects the seed. To check the further spread of the disease, the infected fruits should be promptly picked and destroyed.

SEASONAL PESTS OF CROPS

(*Contd. from page 10*)

good results. The following alternate control measures can also be adopted on a field scale to subjugate the pest:

(1) In small plots the caterpillars of the first brood may be hand-picked and destroyed by ence of the pest later in the season. searching the soil round the base of plants cut by them. This operation will certainly reduce the incidence of the pest later in the season.

(2) Baiting may be done against the caterpillars by using the following formulations. The bait should be scattered on the surface of the soil making sure not to drop it on the leaves of any plant. The quantity of the bait will vary from 10 to 20 lb. per acre according to the dgree of infestation and should be scattered in the evening. It may be necessary to repeat this process more than once to obtain satisfactory results

Wheat bran	100 lb.
Sodium arsenite, white arsenic or sodium fluosilicate	4 to 6 lb.
Water	Enough to moisten
or	
Wheat bran	100 lb.
Paris green	2 lb.
Water	Enough to moisten
Molasses	2 qt.

(3) In the case of tobacco and other crops that are first sown in a nursery seed-bed, dipping the top and the stem (not the root) of the plants at the time of transplantation, in Bordeaux mixture mixed with six pounds of lead arsenate or three pounds of calcium arsenate to 100 gallons of water will give satisfactory results.

(4) Dusting with six to ten per cent DDT or two per cent gamma-Benzene Hexachloride or calcium arsenate at the rate of 10 to 15 lb. per acre according to the degree of infestation will also yield satisfactory results. Great care has to be taken in the use of these dusts. Ordinarily, this should be done only under expert supervision.

(5) Dusting of DDT five per cent with some pyrethrum sold in the market as G-205-P or toxaphene five per cent has been found to give excellent results in potato fields. Many cut-worms come in contact with the insecticides and die. The damage caused to potato tubers is thus reduced and the yield is increased. These insecticides should, however, be used with great caution and under expert supervision.

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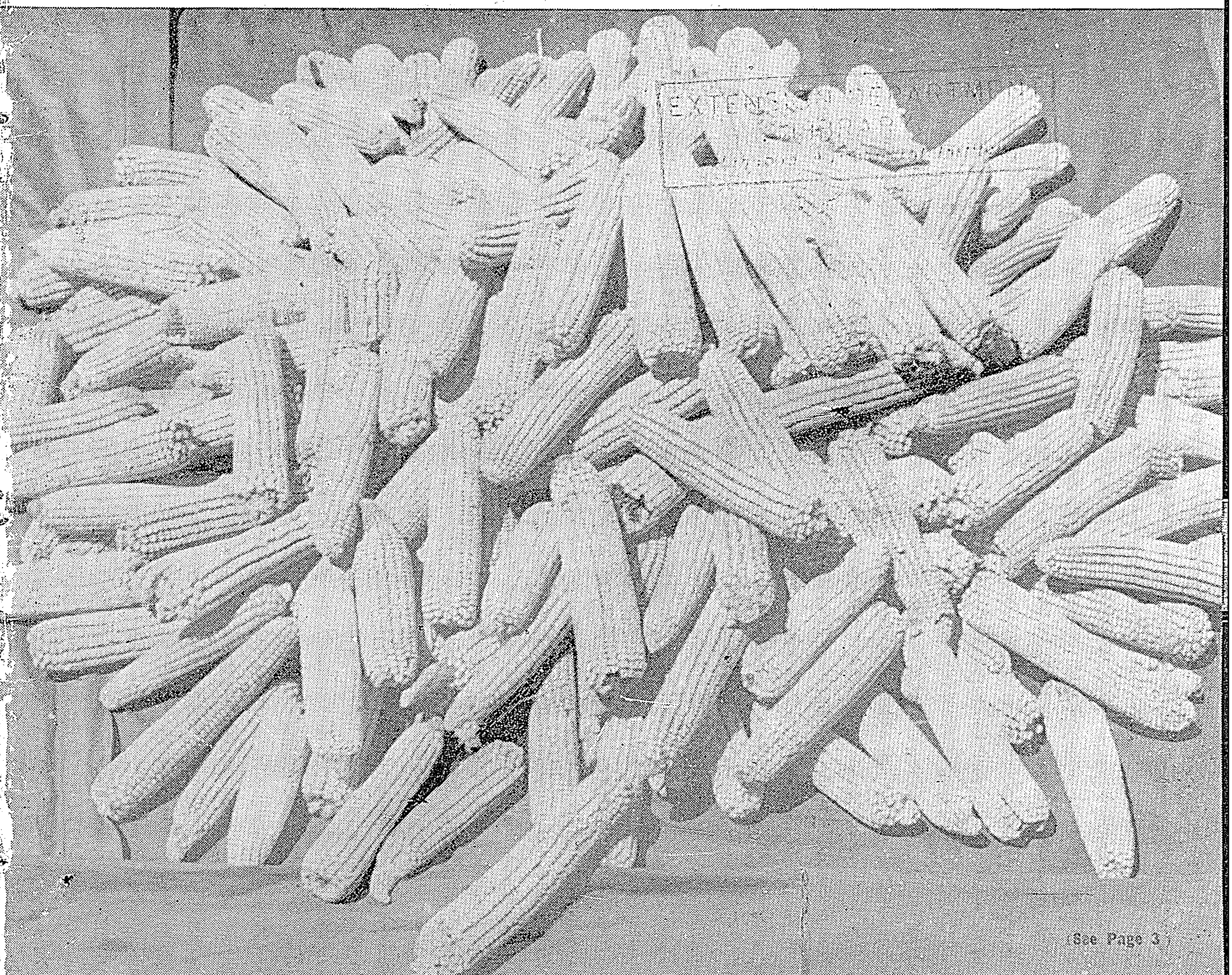

(See Page 3)

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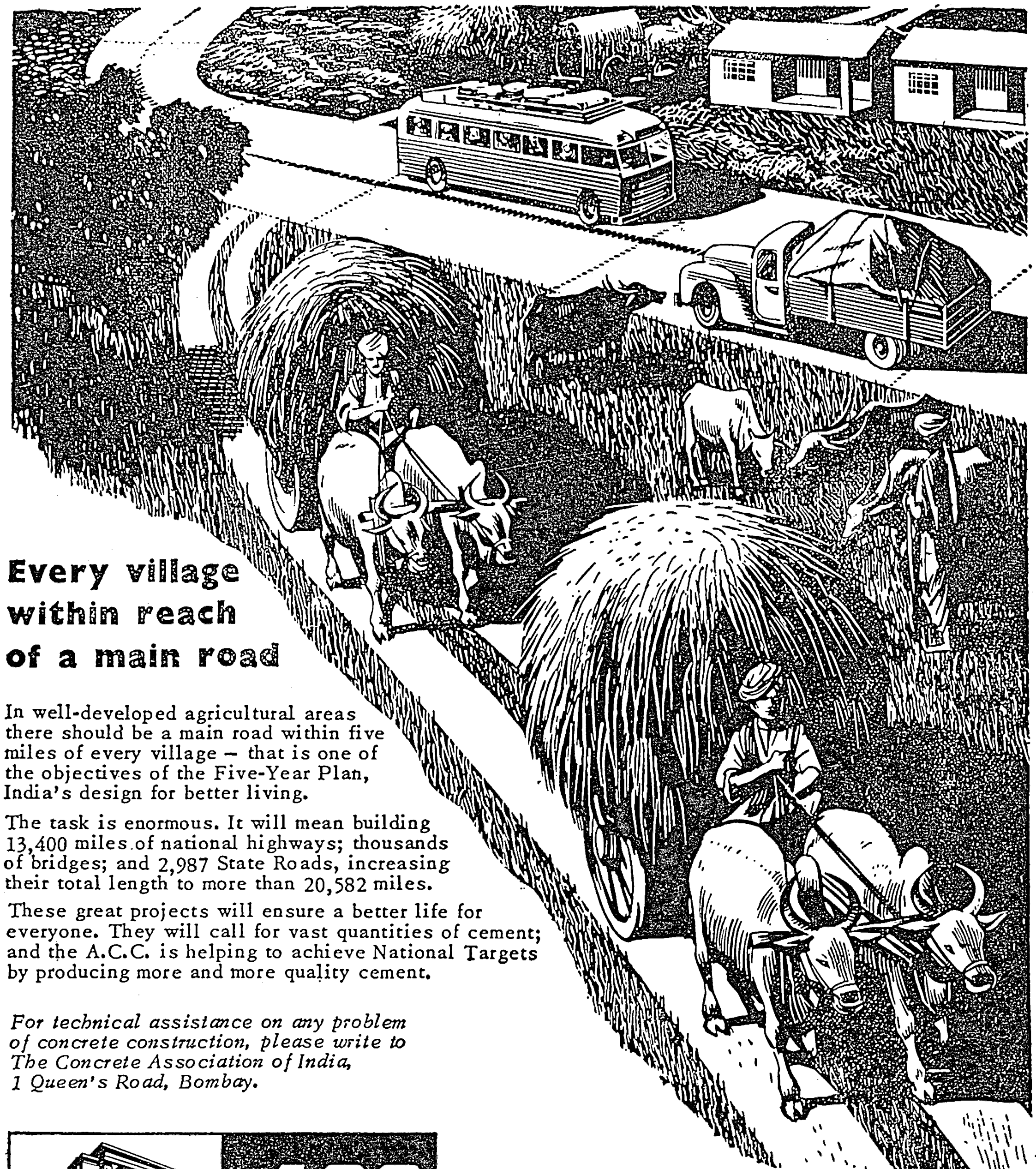

INDIAN FARMING

Vol. IV New Series No. 1 April. 1954

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Printed and published by P. H. Raman at the Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7.

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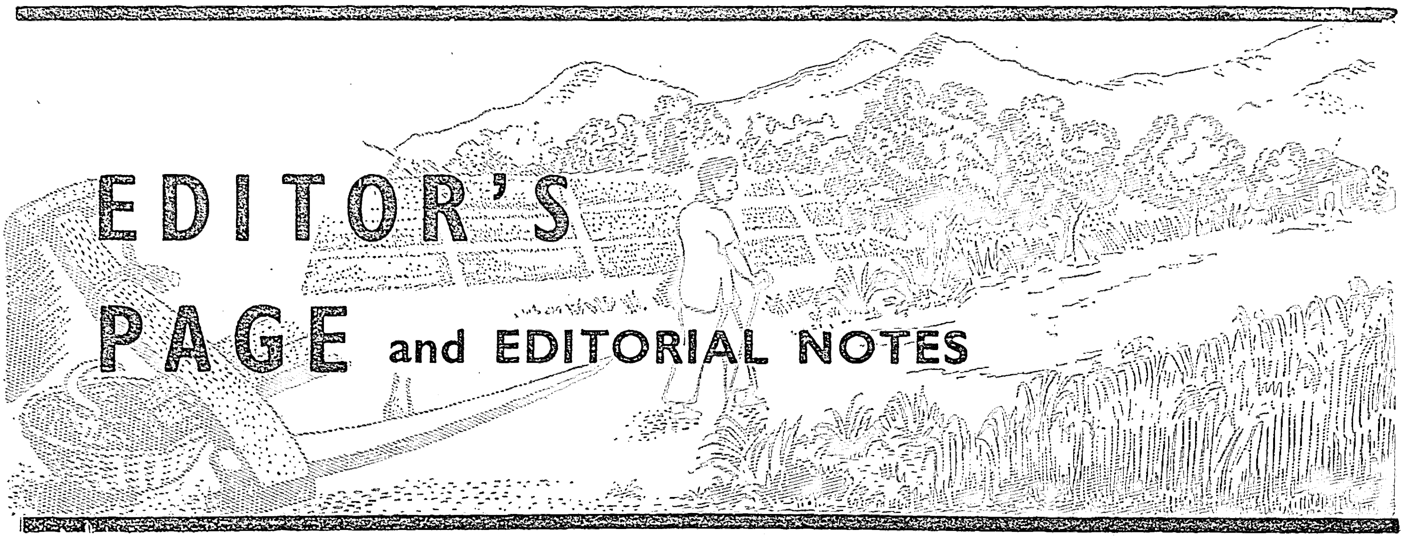


REGENERATION OF AGRICULTURE IN INDIA*

There is immense scope for better rice cultivation in India, and if we sincerely do all we can, there is no earthly reason why we should be not only self-sufficient but also be in a position to export some of our better varieties to countries, like Ceylon, which have been our traditional customers.

In my view, March 15 is a great day because it was on this day last year that we started an intensive campaign in favour of the Japanese method of paddy cultivation all over India. Today is the first anniversary of this comparatively small but epoch-making event, because by it hang my hopes of a regeneration of agriculture in India. What little we have been able to do in the course of 1953 should, I feel convinced, initiate a new epoch in the history of Indian agriculture.

A year back, it was only a venture because there were many uncertainties attached to the campaign. We were not sure how many people would co-operate, what enthusiasm we would be able to generate and what degree of success we would achieve. I am so happy to see that we have been more than satisfied in all these respects, because everywhere our expectations have been more or less realised and in many cases exceeded. Naturally enough, there were doubts about its efficacy and much more so about its applicability under varying conditions in India.

Regarding it as a mere enthusiastic scheme of Government many people were hesitant to go in for it, quite a few more had a very strong objection to the name and thought it derogatory to the antiquity and pride of Indian agriculture that we should have called it the Japanese method. After a lapse of a year, however, I can safely say that most of those who scoffed at it are now inclined to bless it because wherever they have gone the results have been so satisfactory. All the same, I thank them all for this change in their attitude. Now that we have achieved this success, I am not at all sorry that we had some critics as also a few opponents. Their persistent criticism has proved conclusively that our endeavour was severely tested but was not found wanting.

The success of the Japanese method has raised high expectations for the future. As my listeners know, we achieved these results without hardly any cost to the Central Government beyond preparation of publicity material. For want of our own films, we had to use a film produced in Japan, but we did our best to give it the largest possible publicity. This year, we are trying to tackle publicity a little more systematically. I have constituted a small committee at the Secretariat level to co-ordinate activities in the various directions. Wherever old printed material is available, it may be used for the propagation of the method, but we are producing a few new pamphlets and also hope to show films prepared in India.

April 10 and 11 have been fixed for a greater drive. Then I expect the largest number of people, including teachers, professors and social and political workers, to go into the rural areas where paddy is cultivated so that the largest number of people may know about it. In the meantime, of course, further demonstrations would be carried on.

I have more than once expressed my admiration for the help we received from the Kora Kendra people and the Gandhi Smarak Nidhi workers. They toured a large number of places last year and gave

* Speech broadcast by Dr. Panjabrao S. Deshmukh on the first anniversary of the Janpanese method of Paddy-growing from the Delhi Station of All-India Radio. The speech is reproduced here because of its special significance.

Editor

numerous demonstrations. The services of Shri Pran Nath Kapadia and Shri Harish Chandar Patel, who, in fact, brought this method to India, have been of the greatest importance. They have already started training classes and demonstrations.

As I have pointed out previously, this method, which is essentially a more scientific method of better agriculture, is, in some respects, also applicable to other crops. I am happy to say that a large number of cultivators have taken this hint and some Agriculture Departments have shown commendable enthusiasm. The result is that the success of the Japanese method in the case of paddy is also being repeated with regard to other crops with signal success.

In order that we may expand the scope of this method of better cultivation to other fields, I have proposed that May 15 should be celebrated as a day for intensive propaganda in favour of better cultivation of cotton, jute, *jowar*, maize, *bajra* as well as

(*Contd. on page 6*)

IMPORTANT ANNOUNCEMENT

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers and Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, will cease to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi—2.

Editor

CORRECTION

February, 1954 *issue of "Indian Farming"*

Page 27, points (5) and (6) under sub-heading 'Care during pregnancy'

For arrived *Read* avoided.

OUR COVER

A HEAP OF HYBRID COBS.

MAN OF THE MONTH:

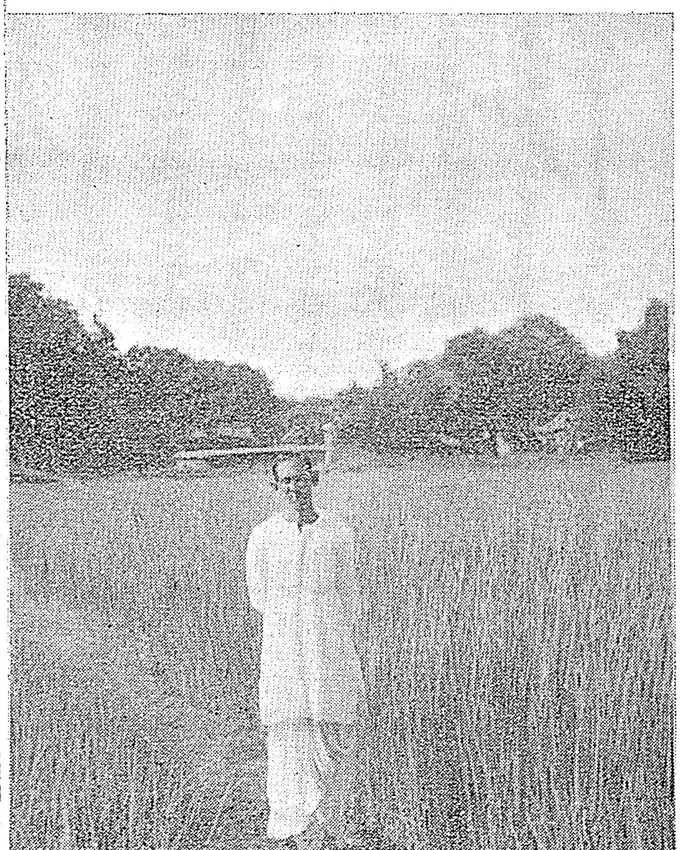
90 MAUNDS OF

FROM BR

By MURARI PROSAD

Farmer Mukherjee

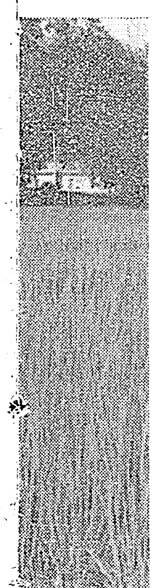
Mukherjee's prize-winning plot



WE were agreeably surprised when we heard that one Shyamapada Mukherjee of village Kendua, contiguous to Suri town in West Bengal, had produced 90 maunds of paddy per acre on an exposed piece of land with red laterite soil covering superficially a murram bed. It was unbelievable that a farmer in this area could ever raise a prize-winning crop on this land.

Fifty-four at present, Mr. Mukherjee had to give up his studies, when he was in the matriculation class due to the sudden death of his father, employed as a *nazir* in the local Collectorate. Almost a lad, he had taken up service in an Estate and looked after the land entrusted to his care. The duties assigned to him enabled him to gain experience in farming methods.

It was about 30 years ago that he purchased the 20 acres of land at present in his possession, out of which 13 acres were situated in one compact block. In this block there was previously a brick-field that had used up the top-soil and had opened up the murram bed below it. The rest of the land was full of various kinds of weeds, wild plum and dates. The land had to be supplied with fresh soil from the undulated plots elsewhere and scrapings of the five tanks that existed there. These tanks, however, are very vital to Mr. Mukherjee's farm now. Besides irrigating his lands, they yield enough fish to ensure a net revenue of about Rs. 500 per annum. The tanks never dry up and the water therein always stands six to nine feet deep.



PADDY PER ACRE

...ICK-FIELD

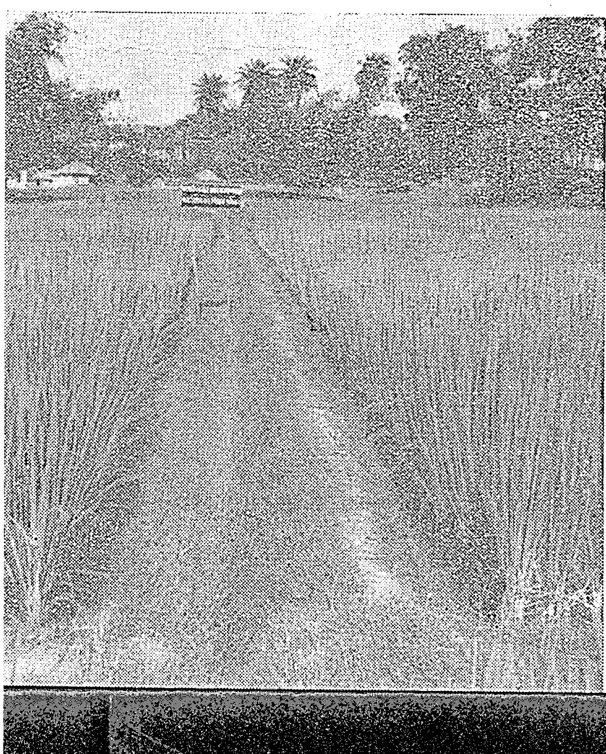
GUHA

During his long career of 30 years as a practical farmer, Mr. Mukherjee has realized the importance of using improved seeds distributed by the local rice research station. Mr. Mukherjee cultivates sugarcane and paddy followed by either wheat or potato or any other suitable vegetable. In addition to these crops, he has raised various kinds of fruit trees bordering the pathways in his well-laid out farm.

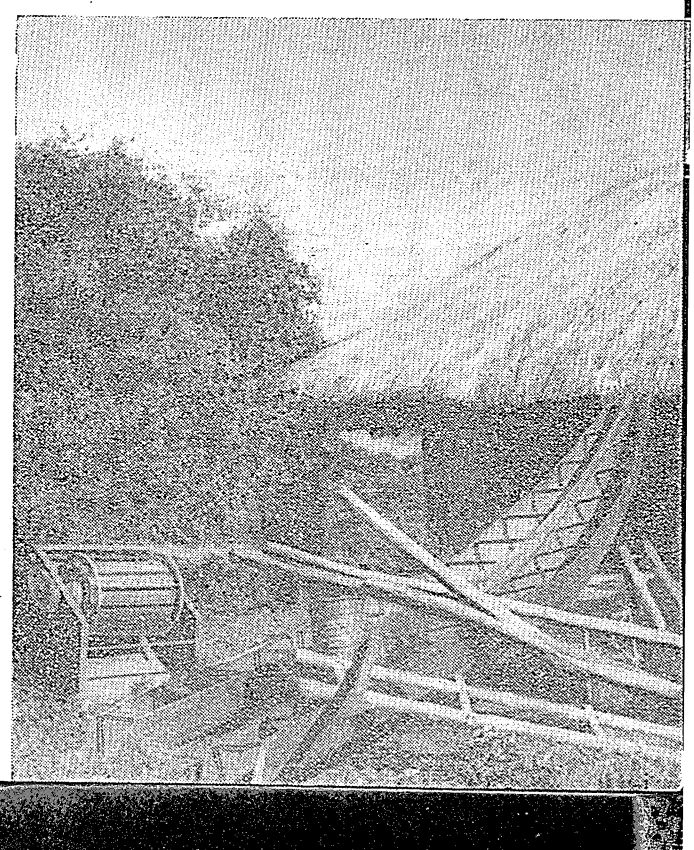
METHODS USED

After harvesting the previous crop of paddy early in January, the stubbles were burnt and two ploughings were given cross-wise to open up the land. During mid-April, 60 cartloads of tank-silt and 30 cartloads of farmyard manure were applied and the land was ploughed to mix the manure with the soil. In the middle of May, six cartloads of cow-dung manure were applied. The land was ploughed again and *sanai* was planted for green manure, the seed-rate being 60 lb. per acre. *Sanai* was ploughed in at the end of June when the plants were 3-3½ ft. high. Then the land was flooded, bunds having been constructed previously on all sides of the field. After about two weeks, the land was puddled.

Paddy crop raised by the Japanese method



Agricultural implements used by Mukherjee



Co.419 variety of canes on Mukherjee's farm

In the beginning of May, a 1/8 acre plot was prepared for use as a seed-bed with an application of 10 cartloads of cow-dung and 60 lb. of bone-meal. In the middle of May, 30 lb. of paddy seed were sown in this plot. The variety of seed used was Raghusail *aman*. The seedlings thus raised were transplanted in the main field three to four days after puddling. Three to four seedlings at a distance of eight to nine inches were planted. After a fortnight, one mulching was given; a fortnight afterwards 60 lb. of sulphate of ammonia and 60 lb. of superphosphate were applied, and another mulching was given. The average number of tillers was 40 and the length of the ear-head was nine inches, with 270-280 heavy grains per ear. The crop was harvested in the presence of the Crop Competition Committee and the yield was estimated to be about 90 maunds for an acre.

GENERAL REMARKS

Mr. Mukherjee himself works along with other farmhands he employs. He has a large family of four sons and five daughters. His second son was sent to the U.S.A. by the Union Government in the International Farm Youth Exchange Scheme.

EDITOR'S PAGE

(*Contd. from page 3*)

ragi. The intention is that the Departments of Agriculture in the States should, as a result of this intensive drive, convey their advice on spacing, seed-rate and fertilizers and manures to as many cultivators as possible and persuade them to try the improved method in respect of these crops on some portion of their land. We cannot obviously be content with increased production of paddy alone; just as we want more rice, so also we want more jute, more cotton, more oilseeds and more of other foodgrains. I have also promised to tackle the question of increased sugarcane production. In order that we may leave no desirable step from being taken, I have suggested August 15 for more intensive propaganda for better cultivation of rabi crops, such as wheat, gram and oilseeds.

The reports received indicate very impressive results wherever the Japanese method has been somewhat systematically applied. Taking all the States which have reported so far together, the additional yield per acre comes to 15.7 maunds. It is significant that the additional average yield per acre in Orissa was 17 maunds, in West Bengal 19.5 maunds, in Travancore-Cochin 21.6 maunds and in Madhya Pradesh 38 maunds. If we compare them with the previous averages, we will be agreeably surprised with the most encouraging results obtained. For instance, in U. P., the output per acre after the adoption of the Japanese method has been reported to be 18 maunds, which normally used to be 5 maunds 35 seers. In the case of West Bengal, we have a report of 95 maunds per acre having been produced by the Japanese method as against the normal yield of 11 maunds. In Bombay and Madhya Bharat, it reached 120 maunds, as against the usual yield of 8 to 10 maunds. Mysore, however, reached the record yield of 144 maunds, compared to the previous output of 7 maunds 15 seers.

Last year, the Central Government offered big loans to the States for the purchase of fertilisers by the cultivators. The Central Government has also allotted a sum of Rs. 10 crores for advances as loans to the various State Governments during the current year. Sufficient advantage does not seem to have been taken of this facility, but I hope that with the popularity of the Japanese method the States will avail themselves of the loans and pass them on to the cultivators to the largest extent possible. If this is done, the complaint that the Japanese method is costly need not be there.

From the figures so far available from the various States, it is apparent that if some care is taken, the difference in the cost between the old and the new method can be very appreciably reduced. Indeed, I have met a large number of paddy cultivators who are prepared to prove that, excepting perhaps the extra cost of chemical fertilisers, there is no reason to spend more on the Japanese than on the local method.

(*Contd. on page 27*)

SEASONAL PESTS OF CROPS:

THE *Anar*-BUTTERFLY, *Virachola isocrates*, FABR.

By

E. S. NARAYANAN,

Head of the Division of Entomology, I. A. R. I., New Delhi

BUTTERFLIES are well-known for their exquisite beauty and an interesting life-history. Few would, however, believe that they can be a pest of agricultural crops and orchards. Indeed there are only a few pests among butterflies and one of the most serious and destructive among them in the Indian Union is the *anar* (pomegranate) butterfly, *Virachola isocrates*. In many orchards in the Middle East a related species, *Virachola livia* Klug, sometimes infests and damages the whole crop.

Pomegranate is considered as an aristocrat among fruits in Egypt, Palestine and other Middle East countries and is popular in India for its medicinal properties. The rind of this fruit contains an acid known as gallo-tannic acid which is administered as an astringent in diarrhoea and dysentery. To the Greeks and Romans, in addition to its medicinal properties, it was also useful as a tanning material. The need for preventing or atleast reducing the damage caused by the *anar*-butterfly needs no emphasis.

V. isocrates has been reported from all the *anar*-growing areas in the Indian Union. In Pusa (Bihar) the damage caused is often high and at times the infestation may be as high as 75 per cent. In the South in Coimbatore, northern Circars, Mysore, etc. the orchardists suffer serious losses from the depredations of this pest. The author has observed infestations of the order of 90 per cent in some orchards in the Coimbatore district. The pest has also been reported from West Bengal.

Each infested fruit has generally a single caterpillar inside it which tunnels through the pulp and fills the fruit with its excreta. Thus the fruit is rendered unfit for human consumption. One or more holes may be found on the rind of the fruit and in one of these holes the anal segment of the caterpillar is visible near the surface. These holes are oftentimes plugged with the excreta of the growing caterpillar. Besides pomegranate, which is its specific host, the pest has also been reported to feed on guava, *loquat*, tamarind, orange and other wild fruits.

LIFE-HISTORY

The female moth which is violet-brown in colour, starts oviposition a couple of days after emergence and mating. The eggs are laid singly on the flowers when the fruit trees blossom. Though rarely, the eggs are also laid on the surface of the tender fruits. The egg is small, dome-shaped and shining white in colour. The minute caterpillar that hatches out of the egg crawls to that part of the fruit where the rind is soft and tender and then bores into the fruit. There it grows by feeding on the sweet pulp as well as the hard seeds. The full-grown larva is short and stout, of a dark colour with short hairs and light patches on its body. It measures about ¾ in. in length and ¼ in. in breadth. At this stage, the caterpillar comes out of the hole and, almost instinctively, secures the stalk of the fruit to the stem with a silky secretion of its own. It is presumed that this binding is done to prevent the falling of the fruit and consequent injury to the pupa inside it. This job done, it retreats into its abode and pupates. Sometimes pupation takes place on the stalk of the fruit itself. This pupa blossoms into a pretty, bluish-brown butterfly which floats in the air like a flower to repeat its picturesque career.

CONTROL MEASURES

The following control measures may be adopted in the orchards:

(1) The infested fruits should be promptly removed and buried

(2) As many adults as possible should be caught by hand-nets and destroyed.

(3) The fruits may be covered with loose muslin-bags

(4) At the Indian Agricultural Research Institute, dusting with Paris-green mixed with lime, talc and flour in the following proportions has given satisfactory results:

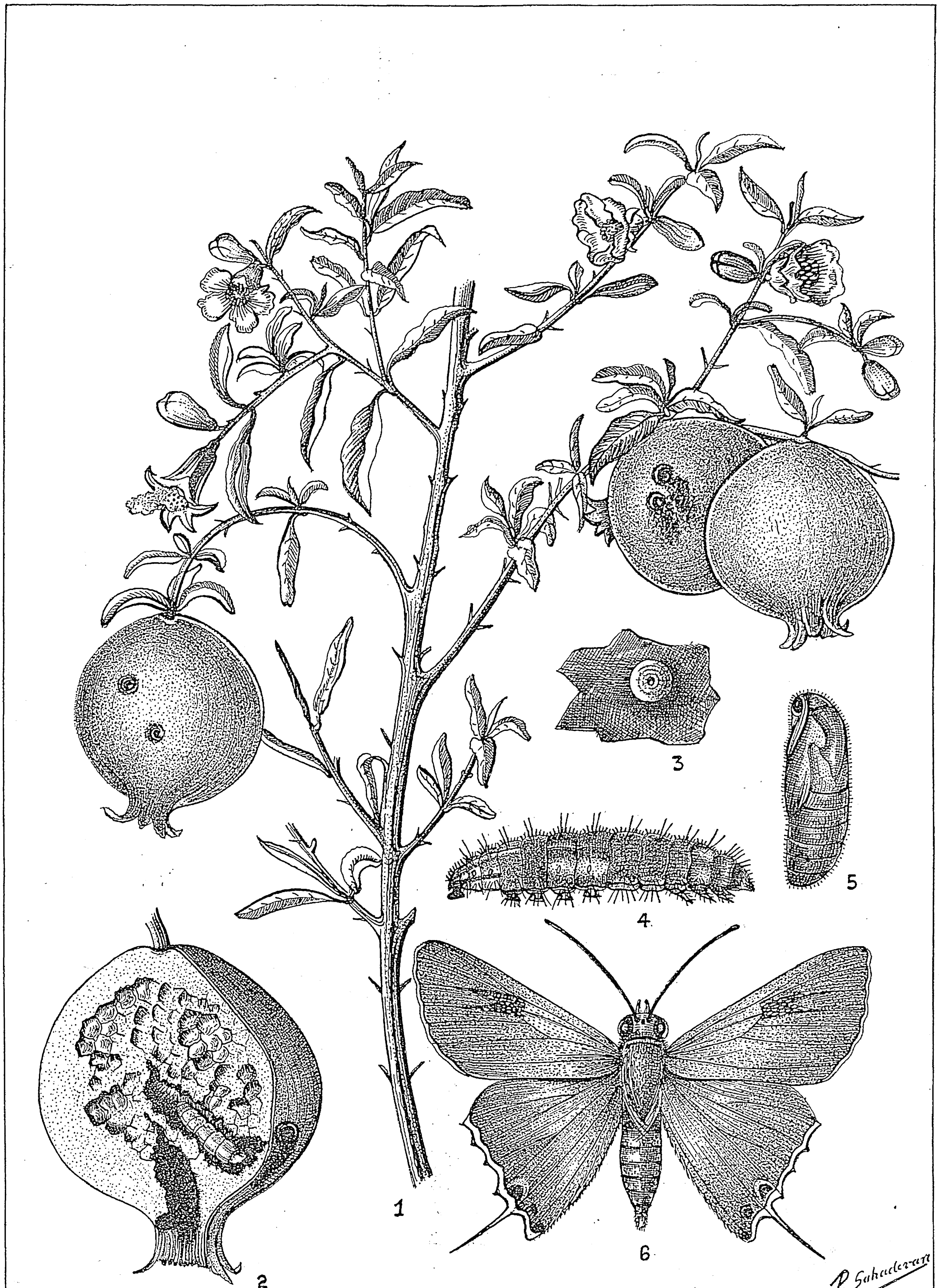
Paris-green	2.25 lb.
Lime	1.25 lb.
Talc	3.75 lb.
Flour	1.0 oz.

Note: This quantity is sufficient for 10 plants only.

Dusting is to be done twice or thrice in a month according to the degree of infestation.

"VIRACHOLA ISOCRATES" FABR.

1. An "anar" plant showing the fruits infested by the pest
2. An infested fruit cut open to show the damage done by the caterpillar
3. Egg
4. Caterpillar
5. Pupa
6. Butterfly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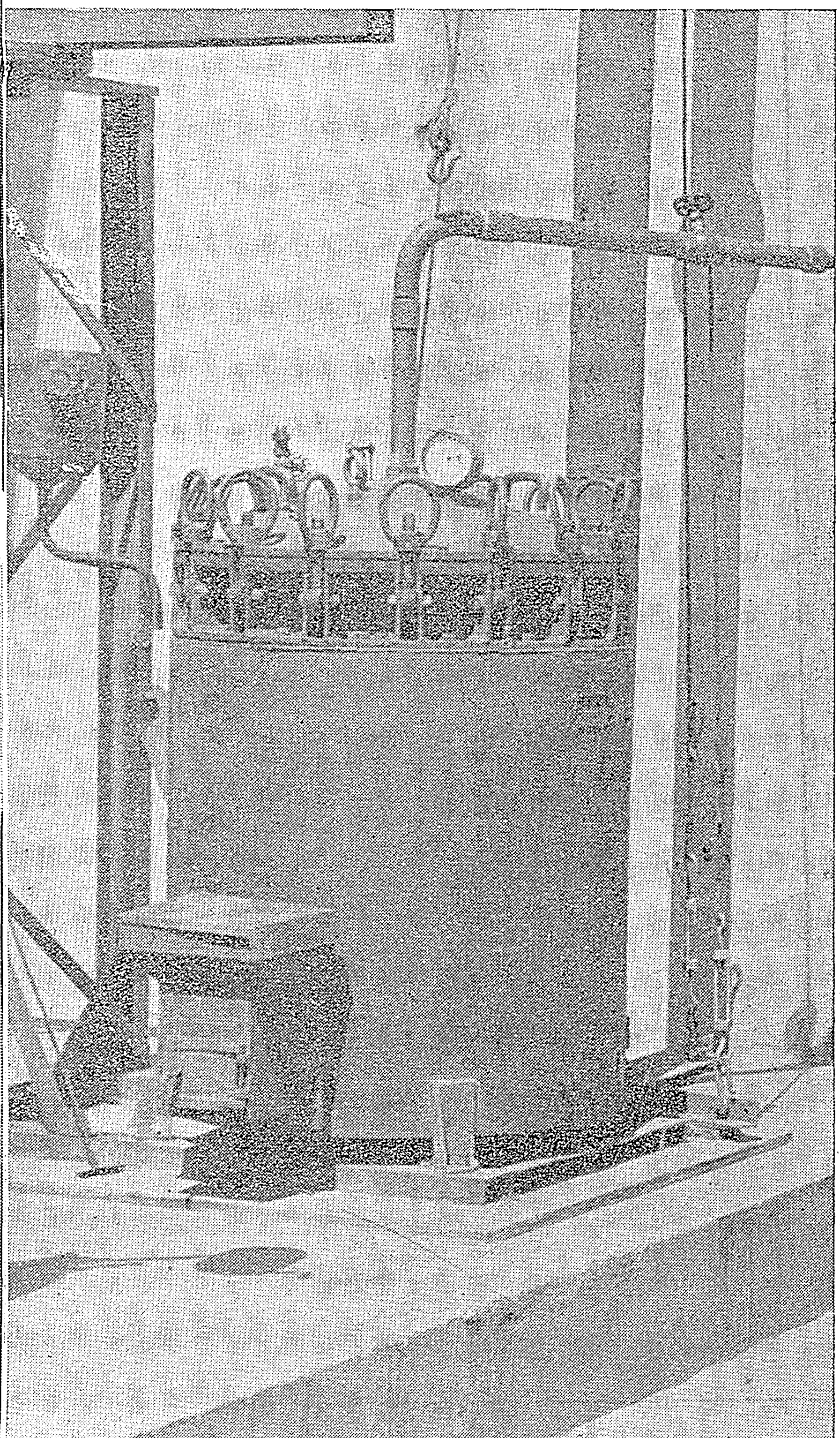
Bone-Digester*

By G. R. VALUNJKAR and P. V. MANE



Bone-digester

PHOSPHATES from an important nutrient available to the plant from the soil. Soils under cultivation should be replenished with this plant-food material by applying phosphatic fertilizers. From time immemorial, bones have been a major source of phosphates to Indian soils. For easy application and better results bones have to be crushed. Various methods, mostly crude, are in vogue for this purpose. In Japan, however, an efficient and practical method for preparing bone-meal fertilizer is practised by using a bone-digester. A high-quality fertilizer, namely, steamed bone-meal is obtained from the working of a digester in addition to other by-products, which makes it a paying proposition. Such a type of bone-digester recently introduced into our country will not only guarantee a supply of adequate quantities of steamed bone-meal at a cheaper price but will also help in the setting up of a new small-scale industry.

A bone-digester is meant for the cooking of bones. Chopped bones, when subjected to hot water and steam lose glue and become soft. These can then be easily ground into a powder to obtain steamed bone-meal which contains a good amount of phosphoric acid and a small quantity of nitrogen.

The first bone-digester imported from Japan and tried at the

*A detailed note on the Bone-digester can be had from the Bone-meal Adviser to the Government of India, New Delhi.

Indian Agricultural Research Institute, New Delhi, had the disadvantage of showing a high cost of working, and as such, was unsuitable for adoption on a wide scale in India. Subsequently, a new type of the digester with necessary improvements to lower the cost of production was designed and tried at the National Physical Laboratory, New Delhi, with successful results.

The digester is 27 ft. (D) x 30 ft. (H) with a volume of about 10 cu. ft. and a capacity of 62 gallons. The whole plant consists of (i) a digester, (ii) a cage to hold the bones, (iii) a combustion chamber with a fire-box and about 20 feet high chimney and (iv) a lifting tackle to lift the heavy lid and the cage.

Normally, a working pressure of not more than 30 lb. is required for steaming of bones and extraction of glue. However, this digester is designed to have a working pressure of 70 lb. and a temperature of 150°C. so that it can be used to sterilize bone-meal so as to be suitable for feeding to cattle.

SETTING UP A BONE-DIGESTER

The digester is self-contained and needs no elaborate construction. It can be worked in the open. A one-foot high paved platform should, however, be provided in order to avoid water-logging. A thatched hut or a small pit of about 1,000 cu. ft. volume should suffice to hold 50 tons of bones. Barbed wire protection to avoid the menace of dogs, jackals, etc. should be provided. Another shed to store fuel, ready bone-meal, tallow and other products should also be constructed.

Bones in their raw condition emit an unpleasant odour. During cooking, especially, a still more unpleasant smell is emitted when the steam is let out and the lid opened. It is, therefore, advisable to set up the bone-digester at a safe distance from human habitation.

WORKING

Bones to be cooked should be made into small pieces of 1½ in. in size. A labourer can cut three to four maunds of bones per hour to the required size with an axe or a hammer.

The cage should be put in the digester and filled with bones. Sufficient water should be added to cover the entire quantity of bones. When the digester is full, the lid should be put on and the digester lighted through the fire-box.

When the pressure gauge shows a pressure of 1-15 lb., fat of the bones melts and comes to the top. The tallow-removing cock of the digester should then be opened and the liquid tallow drained out. This liquid when allowed to cool solidifies and tallow floats on water. This can then be purified and tinned for marketing.

A pressure of 30 lb. for an hour should be maintained for proper cooking of bones. Steam should then be let out and water drained out completely. The bones should be hammered when hot. This helps in removing the sticky glue adhering to the cooked bones and the process of powdering is rendered quick and easy.

The hammered, steamed bones can be worked in a *dheki* or a suitable crushing device, powdered to required mesh, bagged and stored for marketing.

FAT AND GLUE

The main product obtained by working a digester is steamed bone-meal, a valuable phosphatic fertilizer. The by-products are fat and glue. The recovery of fat is important as fat fetches about Rs. 1,000 per ton in the market. Considering this, efforts should be made to collect as many green bones as possible as they contain more fat. Raw bones contain about 15 to 20 per cent glue. However, about 10 per cent glue on the dry bone weight basis is obtained in the process of cooking bones.

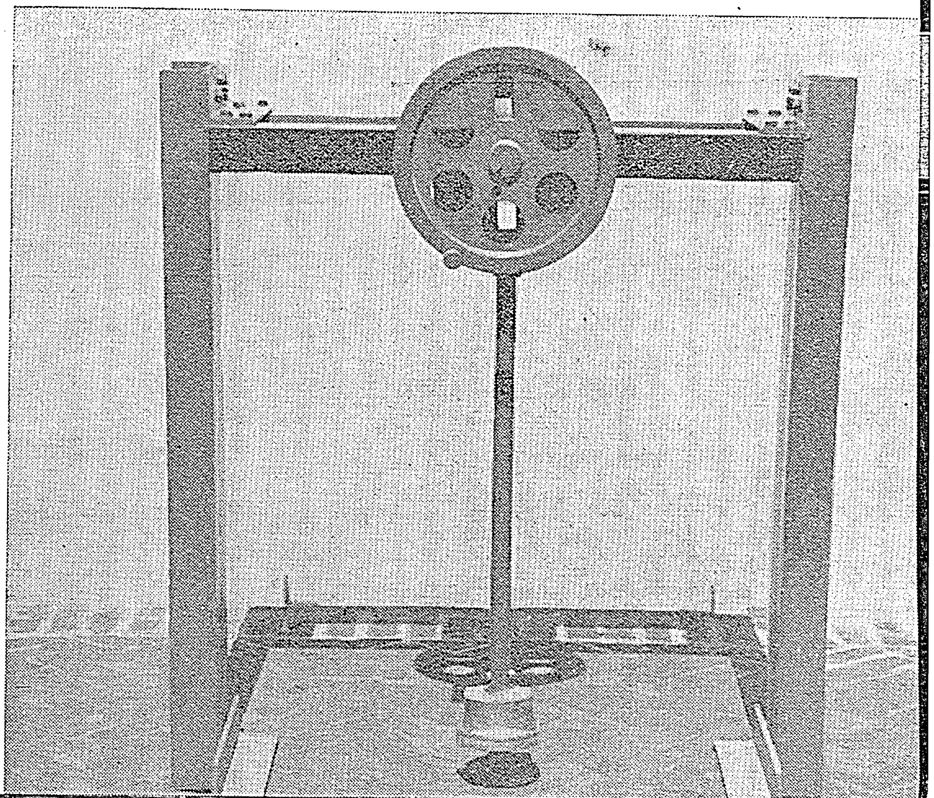
The digester can also be used for cooking dead bodies of animals after skinning, to digest leather cuttings or worn out leather footwear, horns, hoofs, etc.

SCOPE OF THE INDUSTRY

Experiments have shown that about 240 lb. of bones can be cooked at a time. In a working day of

(*Contd. on page 15*)

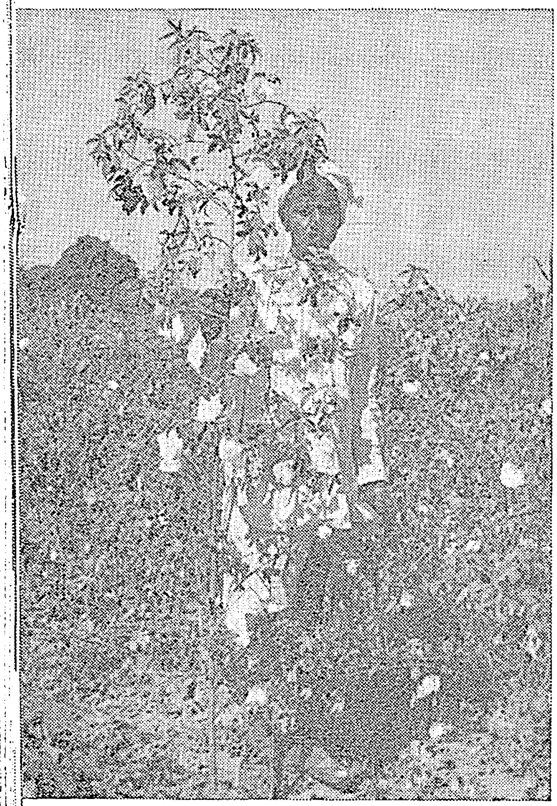
"Dheki" for crushing bones



SOIL CONSERVATION

By N. R. RAMAIYAH

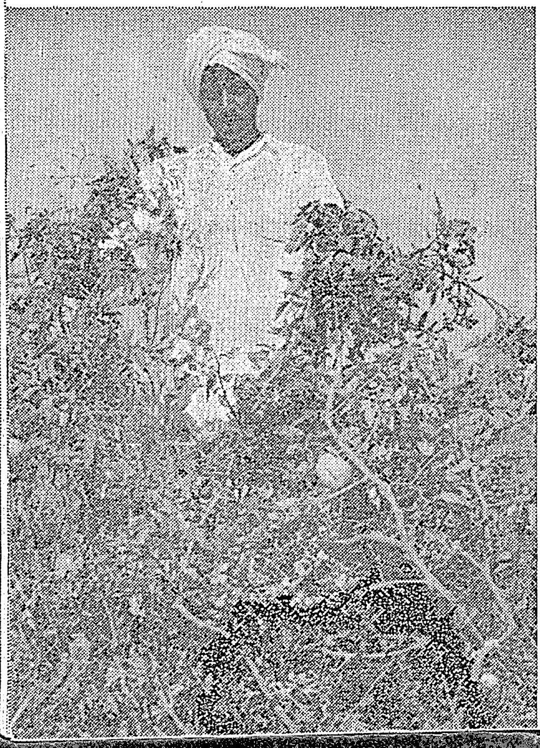
A crop of improved cotton on Saruwadi Farm



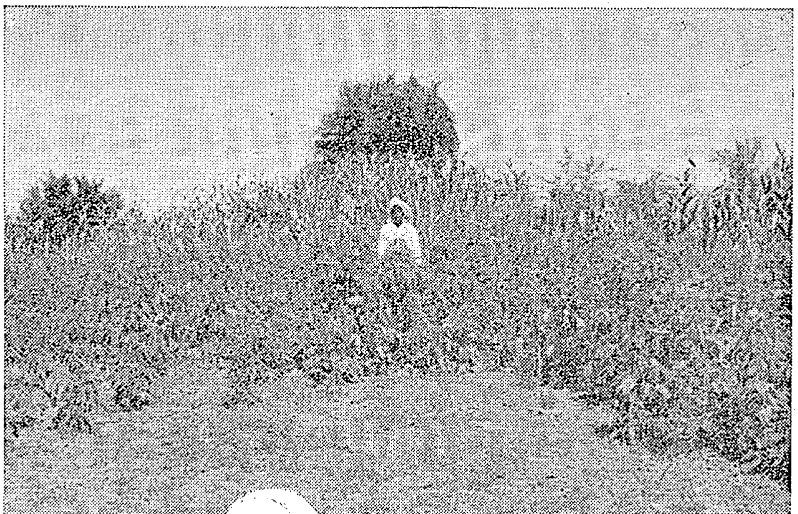
SARUWADI Farm is an ideal farm on the Nagpur-Chhindwara road and belongs to Dr. Dongre. Modern soil conservation practices such as terracing, bunding, plugging of gullies, levelling, etc. are followed on this farm. Dr. Dongre, formerly a medical practitioner, purchased this 64-acre farm sometime ago, at a nominal price of Rs. 25 per acre. This land had been out of cultivation for a long time because of low yields that it gave.

The importance of adopting sound cultural practices has been very well demonstrated on this farm. Besides checking the waste of fertile soil by means of soil conservation methods, Dr. Dongre has improved the fertility of his land by using liberal quantities of farmyard manure and compost; the latter he obtains from Nagpur. The expenditure incurred by him on the improvement of his land has started paying dividends in the shape of bumper crops that are now being obtained from it.

Tomato crop



Once gullied, this land now grows "jowar" and "til"



PRACTICES PAY

"Tur" crop

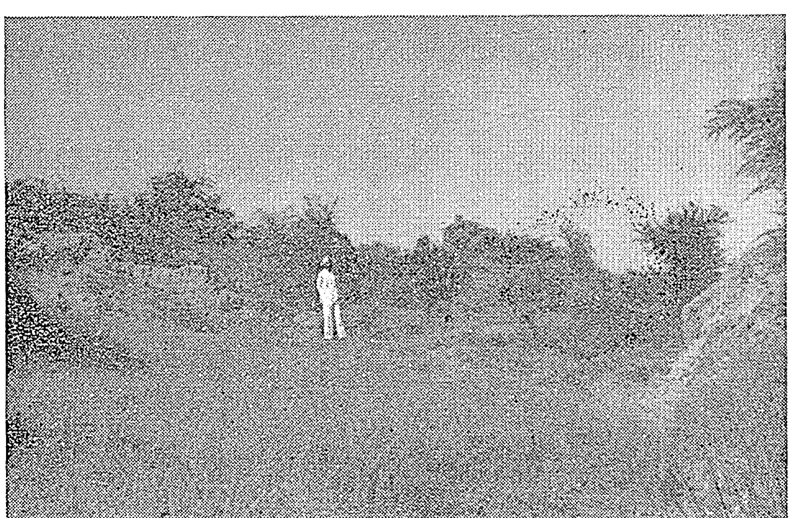
Dr. Dongre has introduced the rainy-season crop of tomato on his farm and grows many other vegetables by irrigation from the small well that he has sunk near his farm-house. Encouraged by good yields, he now proposes to install a pump-set to bring a greater area under well-irrigation. The following figures of yields of various crops raised on this farm speak for themselves:

Year	*Total out-turn in maunds*			
	Jowar	*Tur*	*Cotton*	*Tomatoes*
1950	75	25	—	125
1951	150	25	19½	150
1952	90	60	29½	250

The above figures clearly indicate how the yields have been increasing from year to year. There is, however, a fall in the yield of *jowar* in 1952 over 1951 on account of insufficient rains for the light and slopy soil of the farm, and infestation of the crop by striga.

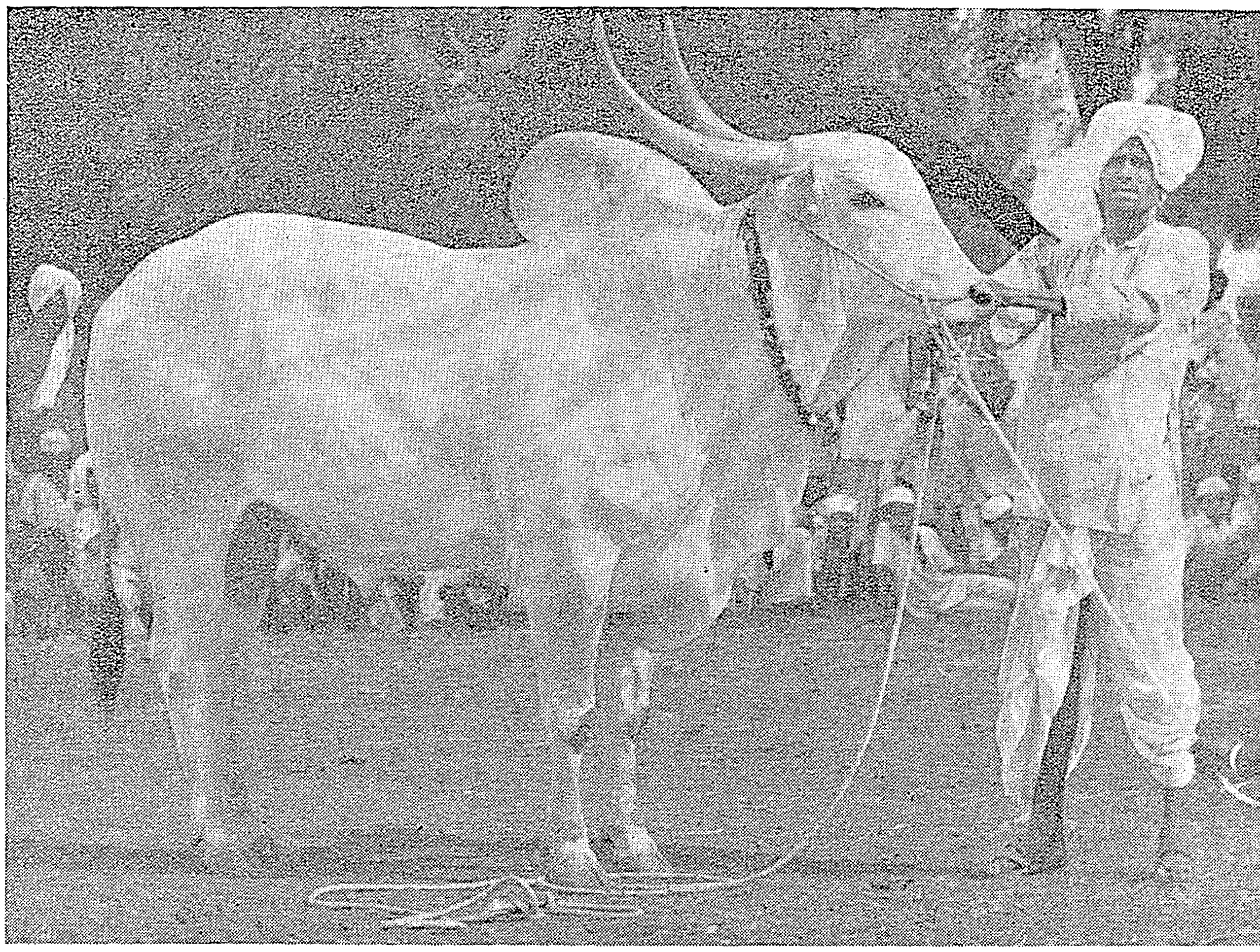
"Jowar" crop

Land made productive by gully-plugging



Khillar Cattle Show at MAHUD

By S. P. DHAMALE



A Khillar breeding bull—the best bull of the Show

INTENSIVE cattle improvement has been undertaken by the State Department of Agriculture in the Sholapur district of Bombay State since 1926. With the co-operation of the local cattle breeders a new breed of Khillar is being evolved here. At one time the Khillar bullocks were considered as fast-trotting draught-animals which could transport goods in quick time and could live even in scarcity conditions. With the changing agricultural conditions in the country it became necessary to mould out of this important Deccan breed, a type which could be useful both as a draught-cattle as well as a milk-yielder. The puny, trotting animal is now being replaced by a heavier and a powerful draught-type.

The farmers once believed that the Khillar cow would not and should not yield milk to the pail as she was to be utilized only for the production of fast-moving draught-animals. This aspect of the maintenance of pure-bred Khillar cow is fast changing with the introduction of the new type, bred in the intensive cattle improvement zone of the Sholapur district. It is not

uncommon for a cow of the new type to yield eight to ten pounds of milk a day, and outstanding animals yield 15-20 lb. of milk at the peak period of lactation. It is hoped that in the next decade the Khillar breed in this area will not only develop as a useful dual-purpose animal but will vie with the best milking breeds of India.

The annual Khillar Cattle Show was held at Mahud, District Sholapur, from 13 to 17 December, 1953.

In spite of acute scarcity conditions that prevailed during 1953, about 4,000 cattle of this breed were brought to the Show which also serves as a market where selected animals of this breed are bought and sold. The farmers from other districts attend the fair and purchase animals for breeding purposes. The local breeders vie with each other in the contest for championship and prizes. This helps them in the selection of superior type, leading to progressive development of the breed. The pure-bred lot is divided into age and sex groups, and each section is judged for its excellence. The special feature of the Show is the milking competition among the animals of the pure-bred type. This year the average milk yield for a period of three days varied from 15 to 19 lb. per day.

Besides the Cattle Section, the Khillar Breeds' Associations, which sponsors the Show, also organizes a section for the sale of sheep and an exhibition of the improved type of sheep. A number of shepherds in the area maintain white-wooled improved sheep. These are brought in large numbers for exhibition. The selected rams and ewes are awarded prizes according to the age groups. A number of school children in this area are helping the Department of Agriculture in rearing fine-wooled rams. A demonstration is also arranged to show how to handle the best types of wools.

One of the important rural occupations in Sholapur district is the rearing of pure-bred and graded poultry. The farmers in the vicinity of this fair bring selected birds for exhibition and competition.

In brief, the Show serves as the focal point for the improvement of livestock in the Sholapur district and adjoining areas. The bulls of the Khillar breed are sent out to all the districts of Deccan, and the farmers from the northern districts of Deccan to the southernmost part of Dharwar district attend this fair to buy the best specimens of the breed.

BONE-DIGESTER

(*Continued from page 11*)

eight to nine hours, four charges can be taken, thus cooking 1,000 lb. of bones per day. The digester can cook about 100 tons per year of 225 working days.

A ton of bones is generally available in a village in a year. A digester of this type can thus be located in a central place to serve 100 to 125 villages. This would ensure the collection of every piece of bone available in the area.

ECONOMIC METHOD

Steamed bone-meal as compared to raw bone-meal contains a higher amount of soluble phosphoric acid and is naturally entitled to a premium price over raw bone-meal. By this method of manufacture, however, the fertilizer costs much less comparatively. In addition, the recovery of tallow and glue adds to the income.

Any cheap fuel such as available local waste, saw-dust, waste tan, paddy or groundnut husk, wood shavings, etc. can be used to bring down the cost of manufacture. At Delhi, saw-dust and waste pieces of packing boxes were used for the experiment.

NEW DELHI EXHIBITION JAPANE

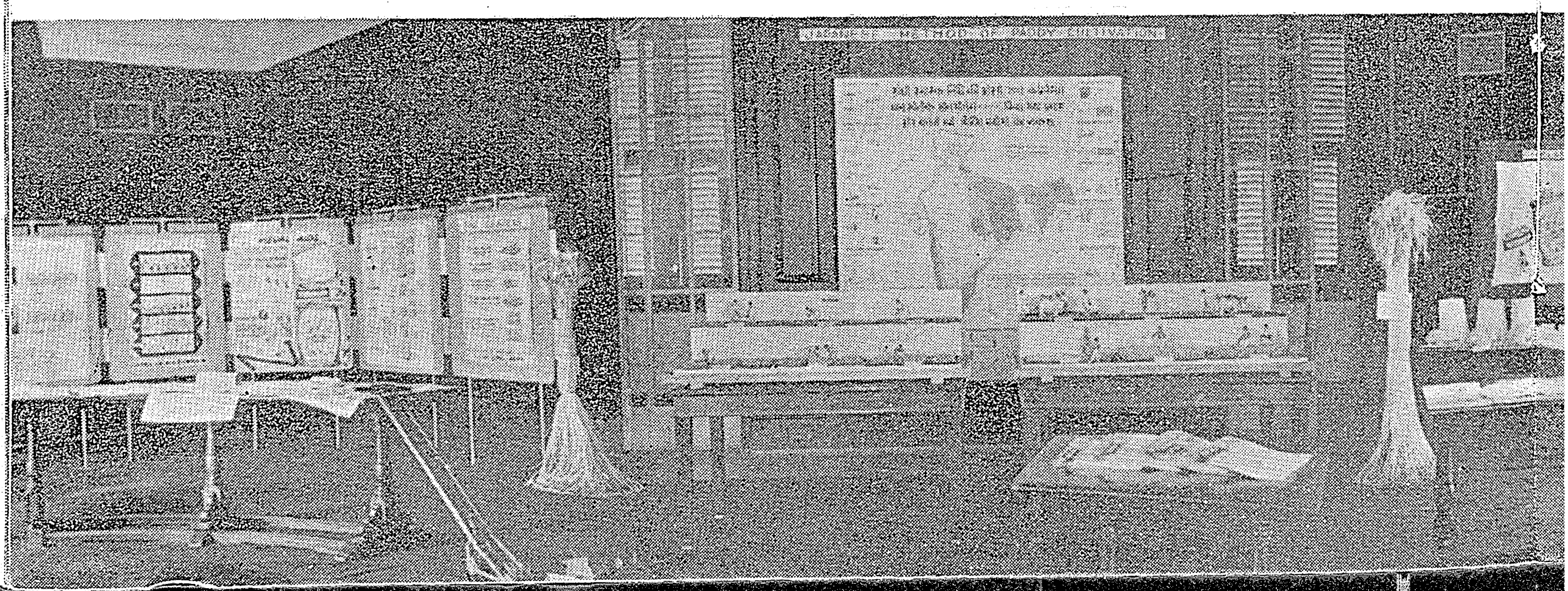
By HARKIRAT

AS part of the propaganda to popularise the Japanese Method of paddy cultivation, an exhibition was organized by the Ministry of Food and Agriculture in Parliament House in New Delhi, from 15 to 18 February 1954. Exhibits were put up representing the various features of the campaign launched by the Ministry in 1953. These exhibits included a pictorial representation of how the campaign was actually organized, the media and methods employed and the results achieved. This exhibition was specially meant for the members of both the Houses. The members evinced keen interest in the Exhibition which was apparent from the eager enquiries that they made about the various exhibits.

The Exhibition consisted of five main panels. The first panel displayed the photographs of a few crop-competition winners. These progressive farmers had distinguished themselves by obtaining very high yields of paddy and had thus created enthusiasm among fellow farmers to improve their yield. Once such a feeling has been generated, it becomes easy to build upon it and introduce better methods. This fact had contributed a great deal to the success of the campaign.

The next panel recorded the various stages of the campaign, namely, meetings of the experts to work out a definite line of action, radio broadcast by the Central Minister of Agriculture to enlist popular support and actual work in the villages to convince the farmers of the benefits of adopting the new method. The success of the campaign as reflected by the encouraging reports from the States clearly indicated that the campaign was well-organized.

The third panel exhibited the various media and methods that were made use of in this campaign to convey the ideas to the farmers. It would not be wrong to say that the media and methods employed formed the core of the campaign. Much depended on them in making the campaign a success. They serve as a vital link between the promoters of the campaign and the man behind the plough. However valuable may the information be, if it is not conveyed to the farmer in a manner acceptable to him, it is likely to fall flat on him. The exhibits in



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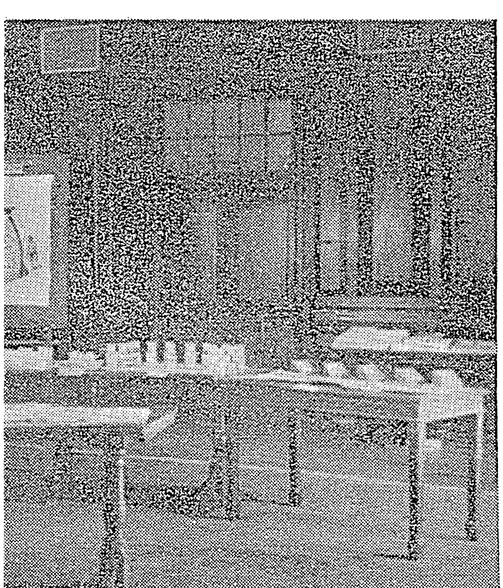
this section included posters, film-strips, pamphlets, circulars, flip-books and the flannelgraph.

The fourth and the fifth panels spot-lighted the vast area at present under the new method, high yields obtained by individuals by adopting this mode of cultivation and the increase in the consumption of fertilizers. It was shown that a total of 2,06,175 acres in different States had been put under the new method. In addition, the method had been partially adopted over additional 30 lakh acres, the part specially accepted being the application of fertilizers. Data relating to the fertilizer consumption revealed that for the period ending 30 September 1953, 2,12,754 tons of ammonium sulphate were consumed as against 1,89,172 in 1952. It may be pointed out here that the data relating to 1953 covered a period of nine months only.

Two effective models sent by the Bombay Government describing the various steps that constitute the Japanese Method were also on display. In short, the various steps are: preparation of a raised seed-bed, selection of right type of seeds, lesser seed-rate, line-sowing at the time of transplanting, proper interculturing, etc. Then there was a collection of the improved varieties of paddy from the States that had been used in connection with the new method. Actual paddy-stalks with their ear-heads intact lent a realistic touch to the Exhibition; profuse tillering on these stalks bore testimony to the rich harvest obtained.

Multi-lingual publications brought out by the Central as well as the State Governments were also one of the items exhibited.

The Exhibition reflected determined efforts on the part of all concerned to produce more, and even a casual visitor was impressed by the exhibits. The spectacular results spoke for themselves. Even if it is accepted, that the Japanese Method is nothing very novel, it has to be admitted that it is a "sane and scientific method of paddy cultivation" and as such deserves promotion. The method has great potentialities for augmenting the food supplies of the country, and that is the strongest point in its favour.



A panoramic view of the Japanese Method Exhibition held at New Delhi

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Business Manager

Maize-Breeding Work In India

By S. M. SIKKA

AMONG the cereal crops grown in India, maize is cultivated over an area of about 8.5 million acres and gives an annual production of over 2.5 million tons, ranks in importance as a food crop next only to paddy, *jowar,* wheat and *bajri.* This cereal occupies the largest area in Uttar Pradesh, Bihar and Rajasthan, but is grown on quite an extensive scale also in several other States of the Punjab, Madhya Bharat, Bombay, Hyderabad, Madhya Pradesh, Himachal Pradesh and Jammu and Kashmir. Maize is of special importance in the hilly and sub-montane regions of the country, where it forms the staple diet of the people particularly in the winter months. In northern parts of the country, it is extensively grown as a fodder crop also. The 'flint' variety, among which the red-grained biotype predominates, forms the bulk of the maize crop grown in this country.

Two varieties of hybrid maize plants (flanking the worker) contrasted with the best U.P. commercial variety (extreme right)

MAIZE-BREEDING SCHEMES LAUNCHED BY I.C.A.R.

Even though maize occupies an important position both as a food and fodder crop of India, it remained practically neglected at the hands of the plant-breeders until about a decade ago. The first concrete step towards the improvement of this crop was taken only in 1945 when the Indian Council of Agricultural Research, in collaboration with the Punjab Government, launched a scheme with its headquarters at Lyallpur (now in Pakistan), for synthesizing improved maize hybrids first at Lyallpur and then at Jullundur on the lines of the work done in the U.S.A. With the partition of India on 15 August, 1947, the venue of this scheme was shifted to Jullundur in the Punjab (India) and its work

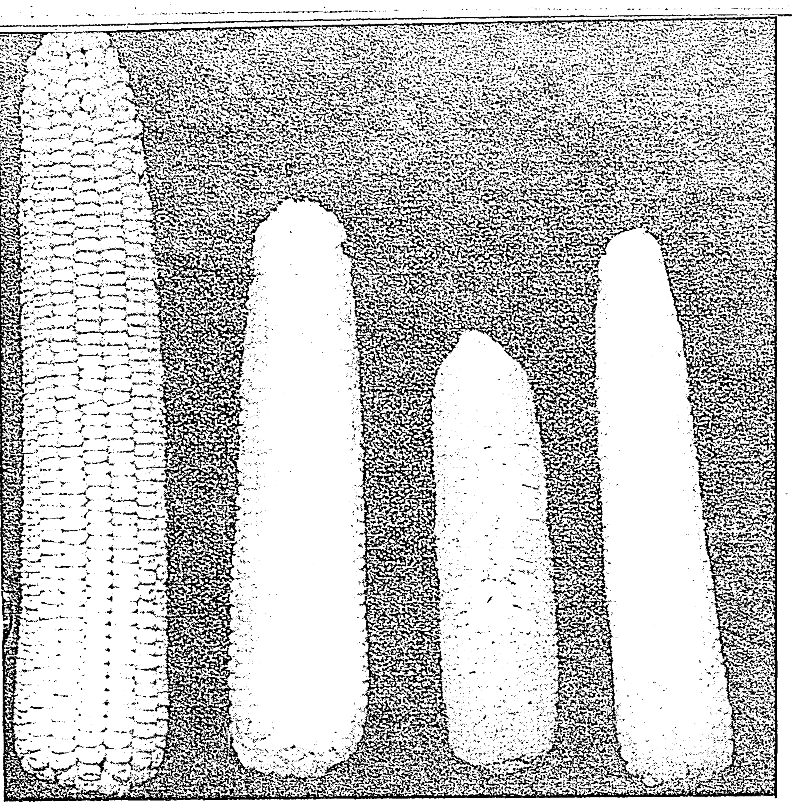
has continued at that place since then. Simultaneously with the sanctioning of the Punjab Scheme, the Indian Council of Agricultural Research extended financial assistance for starting another scheme. At the Indian Agricultural Research Institute, New Delhi, and in several other States breeding work on this crop was taken up. Lately, the Council has sponsored six more breeding schemes jointly with the Governments of Uttar Pradesh, Rajasthan, P.E.P.S.U. West Bengal, Bihar and Hyderabad, and these, along with the Punjab and Delhi Schemes, form a chain for tackling the maize improvement work of the country on a regional basis. The work of all these schemes is being properly co-ordinated by the Council so as to bring about free exchange of breeding material and technical knowledge with a view to achieving results of practical utility within as short a period as possible.

LINES OF WORK AND RESULTS ACHIEVED

The work of all the maize-breeding schemes is being carried out on the lines of the 'hybrid corn' technique, which has been evolved, perfected and so successfully used in the United States of America. The essential steps of this technique are: (i) collection of samples of local commercial varieties of corn and their field-study with a view to spotting out the agronomic merits and demerits of each, (ii) inbreeding of promising commercial varieties through successive generations for isolating inbred lines homozygous in major agronomic characters, (iii) determination of general combing ability of inbred lines through 'top' cross performance, (iv) attempting 'single' and 'double' crosses between promising inbred lines and assessing economic potentialities thereof and (v) production of hybrid seed on a commercial scale for supply to the cultivators. As most of the maize-breeding schemes were launched only recently, their work is yet in its infancy. The Punjab Scheme, which has been in operation for over eight years, has made good headway in so far as over 15,000 plants derived from 300 commercial varieties have been hand-pollinated and quite a few lines, some of which have been self-fed for eight successive generations, have attained apparent homozygosity. The work of this scheme has shown, that while most of the lines do not attain reasonable purity for such characters as yield, height, size of grain, etc., even after six to seven successive generations of selfing, a few do so after only three-four successive selfings. The advantage offered by the latter lines has been fully exploited in this scheme for making 'top' and 'single' crosses at a much earlier stage than it would have been possible normally. So far, over 500 'top' and 1,000 'single' crosses have been made and tested and quite a few of these have out-yielded the best 'local' varieties kept as standards, by significant margins, the excess in yield in some cases ranging over 100 per cent over the local varieties. Some of these cross combinations have been observed to give good performance consistently for two to three years and it is hoped, that, before long it would be possible to develop suitable 'double' crosses from these cross combinations for general cultivation in the State. The work in this connection is being expedited by raising two crops of maize in a year, the first, early one, grown in the spring season in hills and the second the normal monsoon crop. Raising two crops of maize in a single year has been adopted in some other schemes also with a view to advancing the breeding work as much as possible.

While the schemes in the Punjab, P.E.P.S.U., Uttar Pradesh, Rajasthan, West Bengal, Bihar and Hyderabad are concentrating on synthesis of high-yield hybrids, the emphasis in the scheme operating at the Indian Agricultural Research Institute, New Delhi, is mainly on problems of fundamental importance, The most important aspect, on which work is

A cob of U.S. 13
at Almora



Four main types of maize—(left to right) dent, flint, sweet and popcorn.

being carried out under this scheme, is to find out short-cut methods, by which inbred lines could be produced in one step instead of seven to eight years required under the commonly used selfing method. Comparative merits of selfing and sib-mating for the production of inbred lines are also being investigated. Still another problem of far-reaching value being tackled is connected with the study of methods by which the hybrid vigour usually exhibited by the F1 plants could be conserved for two or more generations so as to obviate the necessity of producing hybrid seed of promising crosses every year. In this connection, the effect of induction of polyploidy in open-pollinated and inbred lines as well as that of making multiple crosses of diploid and polyploid inbreds is being studied. The possibility of synthesizing high-yielding strains by the application of the convergent improvement method is also under investigation. These studies, if successfully completed, will greatly simplify the maize-breeding technique. Their results have, therefore, to be watched with great interest.

TRIAL OF FOREIGN HYBRIDS

As 'hybrid corn' technique is a long range process, requiring 8-10 years for bringing out an improved variety of maize, the Indian Council of Agricultural Research thought it advisable to import ready-made double crosses of 'dent' corn from the U.S.A., Australia and Canada and to test them in this country with a view to finding out if any of them would suit the Indian conditions. At the instance of the Council, therefore, The Indian Agricultural Research Institute, New Delhi, arranged a co-ordinated trial of 36 foreign hybrids in almost all the important maize-growing States. These trials have been carried out both in hilly tracts and plains for the last three years and the indications are that some of them can be successfully grown in this country, particularly in the hilly tracts. The results have been generally favourable to American and Australian hybrids, among which U.S. 13, Dixie 11, Dixie 22, Dixie 33 and N.C. 27 have recorded better yield performance than the local varieties tested against them. In the Punjab, U.S. 13 has outyielded the local maize of Kulu Valley consistently for three years with an average yield excess of 7.94 md. of grain per acre.

PRODUCTION OF HYBRID SEED ON A COMMERCIAL SCALE

Since, as a result of the work done in some of the maize-breeding schemes, high-yielding double crosses are likely to become available shortly, the Indian Council of Agricultural Research, has already initiated steps by which production of hybrid maize seed on a commercial scale could be arranged on modern lines. The most important problem that has to be faced in this connection is that there are no commercial firms of the type met with in the U.S.A., in this country for undertaking seed production work. The Council is, therefore, procuring the services of an expert under Point-4 Programme to advise on this important subject.

Side by side with the above arrangements, the Council has recently initiated a pilot scheme at Almora in Uttar Pradesh for producing annually 100 maunds of seed of U.S. 13, which exotic hybrid has given good yield performance in some parts of the country and of which inbred lines are available.

DEVELOPMENT OF SWEET CORN

Apart from the breeding schemes which aim at evolving improved hybrids of the local 'flint' corn, the Council sanctioned in April, 1952, a scheme for

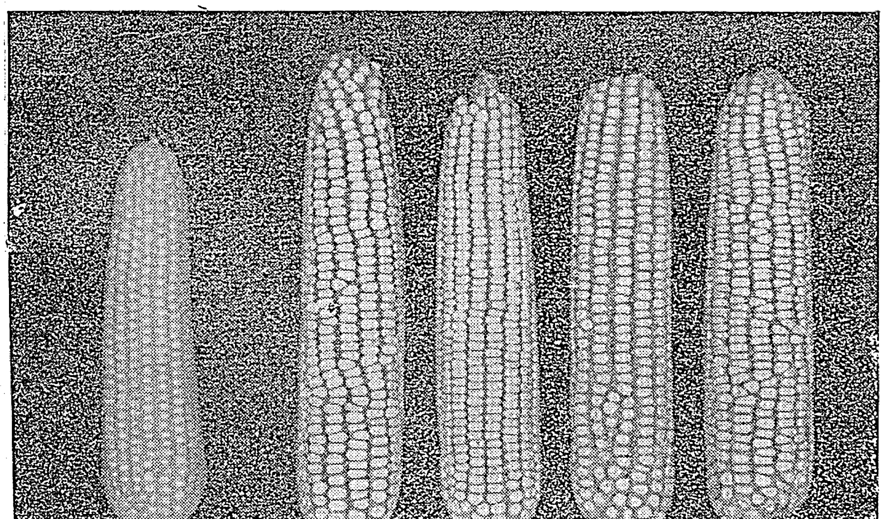
developing cultivation of sweet corn in the hilly tract of the Punjab (India). This scheme is functioning in Kulu Valley of Kangra district and work of testing imported varieties of sweet corn as well as finding out the agronomic treatments which will enable such corn to be cultivated successfully, is being pursued thereunder. As the work of the scheme has been in progress for only one season, it is premature to arrive at any definite conclusions. However, the indications are that some of the imported sweet corn hybrids can adapt themselves to the local conditions and give as good yield as the indigenous 'flint' varieties.

ALL-INDIA BEE-KEEPING CONFERENCE

The All-India Bee-keeping Conference, convened by the All-India Bee-keepers' Association, will be held at Mahableshwar in North Satara district of Bombay State, on 8, 9 and 10th May, 1954. The Conference will take place under the auspices of the Village Industries Committee, Bombay State.

Those interested may write to Shri S. G. Shende, Regional Organiser, Village Industries Committee, Bombay State, Maharashtra Region, 361, Sadashiv Peth, Poona 2.

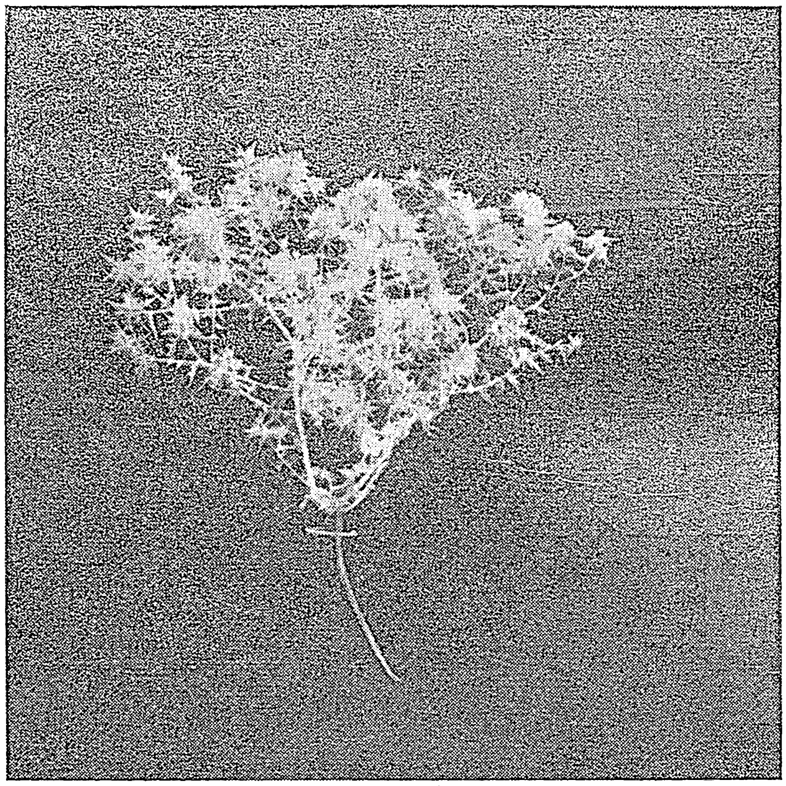
Technique of controlled pollination



The cobs of Pusa Yellow and a number of maize hybrids

FARMERS, BEWARE OF THE WEED —*Carthamus oxyacantha*, BIEB

By D. N. SINGH



"Carthamus oxyacantha", Bieb

CULTIVATORS in Uttar Pradesh believe that the seeds of the weed *Carthamus oxyacantha*, Bieb., locally known as *kateri* or *balesara,* were brought to this State by the *pili aandhi* (yellow dust-storm) a few years ago. These seeds are white, whitish or mottled and resemble safflower seeds, though smaller in size. These seeds lie dormant in the soil throughout the rainy season and winter but begin to germinate as the weather warms up in March. The drier the field the more rapid is the growth of the seedlings. These seedlings are found growing in abundance in the fields sown with wheat and barley, and in the plots having no crop at all. In the fields sown with other *rabi*-crops only stray plants are to be found. In the fields under *arhar*, these are conspicuous by their absence excepting on bunds (ridges).

HOW IT SPREADS

Apparently, a strong sun and a dry weather are conducive to the growth of this weed while shade and moisture retard it. By the harvesting time of the *rabi*-crops, the hardy, branchy and spiny plants of this weed fully establish themselves and attain a height of about six to nine inches. Because of their numerous prickles, persons harvesting the crops dare not touch them and leave them out to grow undisturbed with no crop plants to compete with them. Inflorescence starts early in April or even earlier than that and about the middle of this month, the infested areas assume a yellow appearance because

of the same colour of the flowers. Flowering and fruiting continue till June. The seeds which are produced in hundreds by a single plant, are distributed over large areas by the summer winds. In this way, this weed goes on spreading wildly.

Carthamus oxyacantha belongs to the family *Compositae* and exhausts the soil very much. In spite of all agronomical literature advocating hot-weather cultivation and efforts of the Agriculture Department to convince the farmers of the advantages of this practice, it has not been adopted excepting on Government farms and a few other private farms belonging to progressive farmers. Because of excessive heat in summer causing denitration, unopened soil of the State loses a considerable amount of nitrogen and is thus depleted of the most important ingredient of plant-food. Thick growth of this weed does prevent denitration to some extent, but being very exacting, the plants of this weed absorb a much greater quantity of plant-food from the soil, leaving it greatly impoverished. As a result, the crop-yields are considerably reduced. Besides, the spiny plants of this weed render the harvesting of *rabi*-crops very inconvenient. Usually, the cultivators cut these plants before the advent of the monsoon, collect them and burn them in order to avoid injury to their feet from the spines while ploughing the fields. But by then, the seeds are already spread over the land.

CONTROL MEASURES

Early action is needed to destroy this weed wherever it exists at present and to stop further dissemination of its seed. The following suggestions are offered to get rid of this menace:

(1) Wherever possible, land may be opened with a soil-inverting plough soon after harvesting the *rabi*-crops. This weed will thus get uprooted, buried and converted into manure.

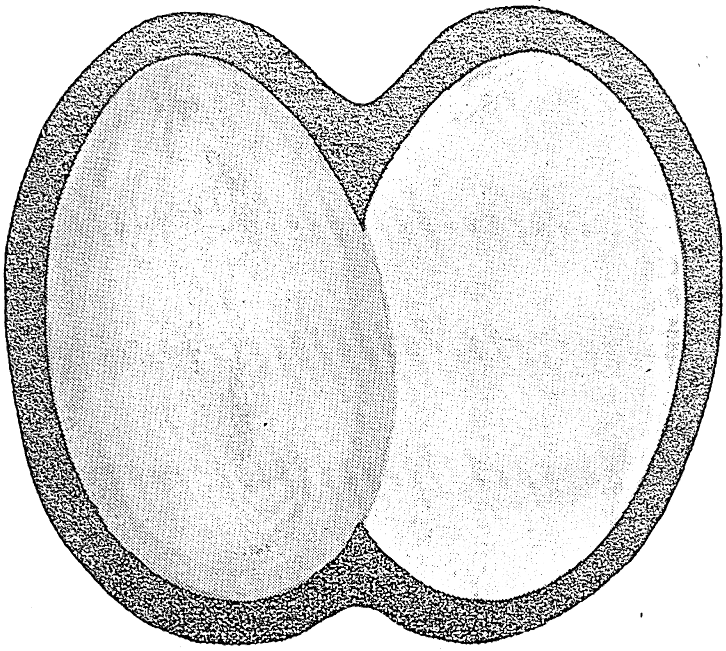
(2) Plants should be cut before they start flowering and buried in a pit and composted.

(3) Crops like *arhar* may be raised in the fields infested with this weed with a view to smothering the weed.

Piece-meal eradication of the weed will be of no avail as dry plants and seeds are easily blown away from one place to another by strong wind. Co-operative efforts should be made to destroy the weed before its flowering stage sets in.

CONTRIBUTORS ARE REQUESTED

to kindly submit two copies of all articles, notes, etc. intended for publication in "Indian Farming". The articles should be clean-typed in double space on one side of paper, leaving a sufficient margin on the left-hand side. Contributions may be addressed to the Editor, "Indian Farming", Indian Council of Agricultural Research, Jamnagar House Hutments, Mansingh Road, New Delhi 2.



A FEW WORDS ON DUCK-KEEPING IN ASSAM

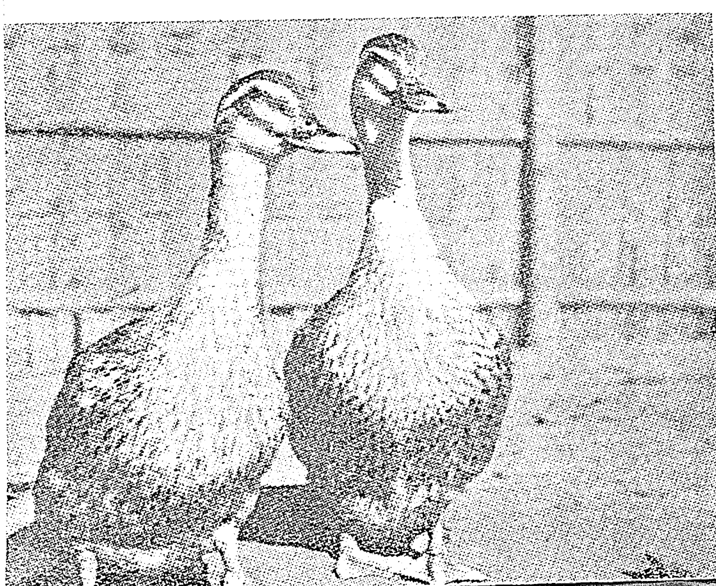
By D. L. PAUL,
Assistant Deputy Director of Animal Husbandry & Veterinary Department (Livestock), Assam

THE State of Assam has a good rainfall (an average of 150 in.) which encourages several species of wild ducks and water-fowls living and breeding in its rivers, lakes and swamps. The domesticated birds frequently mix with the wild birds, and as a result, some nondescript breeds are met with here. These are maintained by the local people living in the plains and low-lying areas for producing meat and eggs.

According to the census of 1951, the State possesses about 15,18,494 ducks worth about half a crore of rupees. A trade of the value of a similar amount is being carried on annually in the State by way of supplying eggs and meat from the ducks. In fact, a substantial portion of the State's supply of eggs is derived from the ducks. While working for the improvement of the ducks, it was found that some of the native types possessed potentialities which had also attracted the attention of the Livestock Department of the State in its early days. Lately, with very limited resources a few trials were laid out to find out a 'utility strain' of ducks which could be at home in lakes, ponds, streams and other aquatic areas of the State and which would also compare favourably with the famous foreign ducks like Aylesbury, Pekin, Khaki-Campbell, Rouen and the famous Indian Runner.

Three country-types of ducks, viz., Local Mete, Nageswari (white-breasted) and Cachar Nageswari (big type) were selected in or about the year 1937

The local breed, Mete ("Pati Has")



Assam Nageswari ducks (white-breasted)

and stocked at the Pukra Duck Farm near the Habibganj Farm (now in East Pakistan) for studying their potentialities.

Work on these birds could not be completed as the stock with the farm had to be handed over to Pakistan in 1947.

IMPORTED DUCKS

In the meantime a small lot of Khaki Campbell ducks was also imported from England in or shortly after 1938 by Messrs. Woodford and Hazarika, and was kept at the Khanapara Farm. But this small lot did not show any superiority over the local breeds in its new environments during the short period it was under observation, and could not be maintained for a longer period on account of abolition of poultry development work in this State.

Although the Pukra Duck Farm no longer belongs to this State, certain information collected as a result of the work done there in the past might be of some interest and is briefly mentioned below.

LOCAL DUCKS

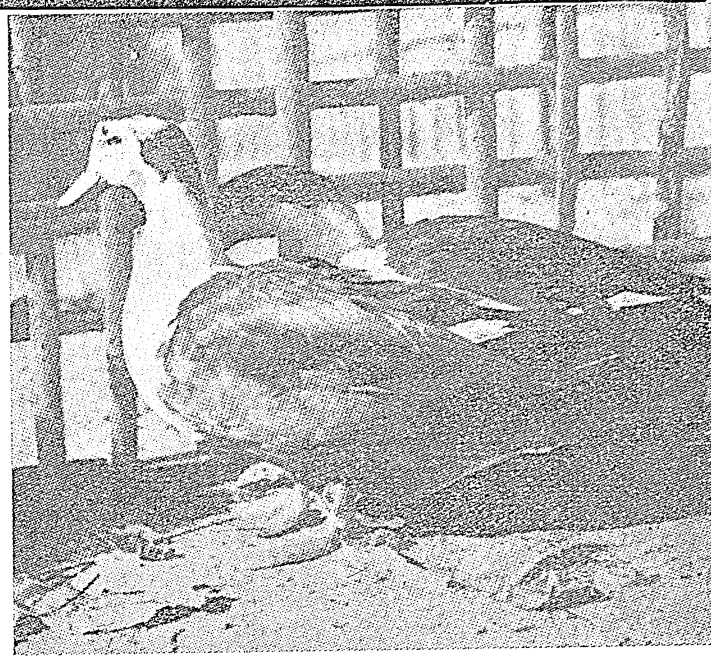
The local breed Mete (*Pati Has*) was tried. Under farm conditions, with proper feeding, breeding and management the results obtained were:

Weight of male	$3\frac{1}{2}$-4 lb.
Weight of female	3-$3\frac{1}{2}$ lb.
Number of eggs laid annually	100-150 per female
Colour of eggs	White
Weight of egg	1.5-1.8 oz.
Colour of females	Dark-brown, black-pencilled and shaded grey
Colour of males	Irridescent green and blue, glittering to some extent, with a light collar-mark

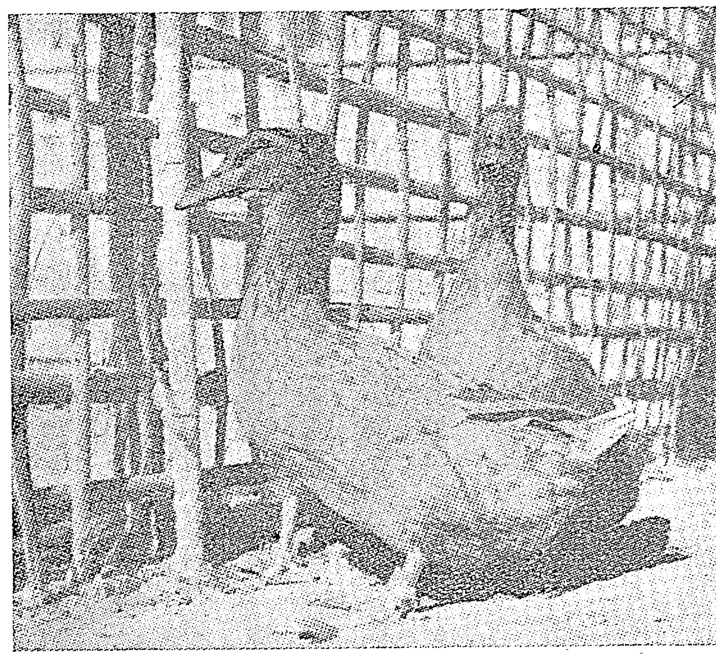
When the male duck matures, a few of its tail feathers curl upwards. The ducks of this breed resemble the famous Rouen duck which is considered as a direct lineal descendant of the wild Mallard.

Nageswari ducks have black-coloured back with a white breast, bearing some likeness to Blue Swedish duck, but lay greenish eggs like Rouen ducks. With good management, breeding and feeding the following results were obtained:

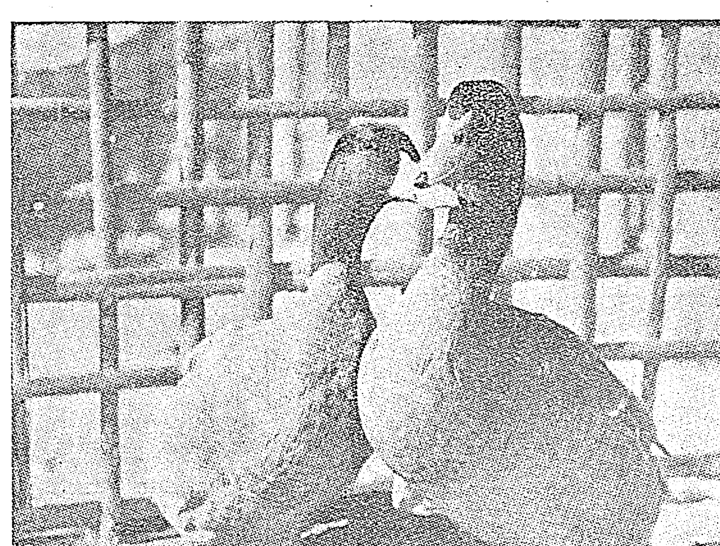
Weight of male	$3\frac{1}{4}$-$3\frac{1}{2}$ lb.
Weight of female	$3\frac{1}{4}$-$3\frac{1}{2}$ lb.
Number of eggs laid	100-150 per duck generally; instances of 200 eggs in a year were not rare
Colour of eggs	Greenish; some of the birds of this breed were also found to lay eggs of a snow-white colour
Weight of egg	More than two ounces



Assam Nageswari drakes (white-breasted)



The Khaki-Campbell ducks imported from England



The Khaki-Campbell drakes imported from England

Cachar Nageswari ducks are of a dark-brown colour with black-pencilled tips and have a long body. They lay greenish eggs. Work on these birds did not make much progress before the partition and very few observations are on record.

CONCLUDING REMARKS

Ducks play an important role in the rural economy of Assam. Besides supplying food, ducks control many animal diseases by eating up snails, etc. In view of their natural immunity against many diseases and the large number of streams, pools and lakes available in the State due to abundant rainfall, duck-keeping, if properly undertaken can appreciably supplement the national income. So long, duck-keeping has been tried in the Livestock Farms of the State as a side-show along with poultry-keeping, but systematic and concentrated work on an adequately large scale is expected to improve the indigenous birds and thus add to their utility. It, therefore, seems desirable that as a measure of developmental work, establishment of duck-farms should be encouraged on a regional basis.

EDITOR'S PAGE

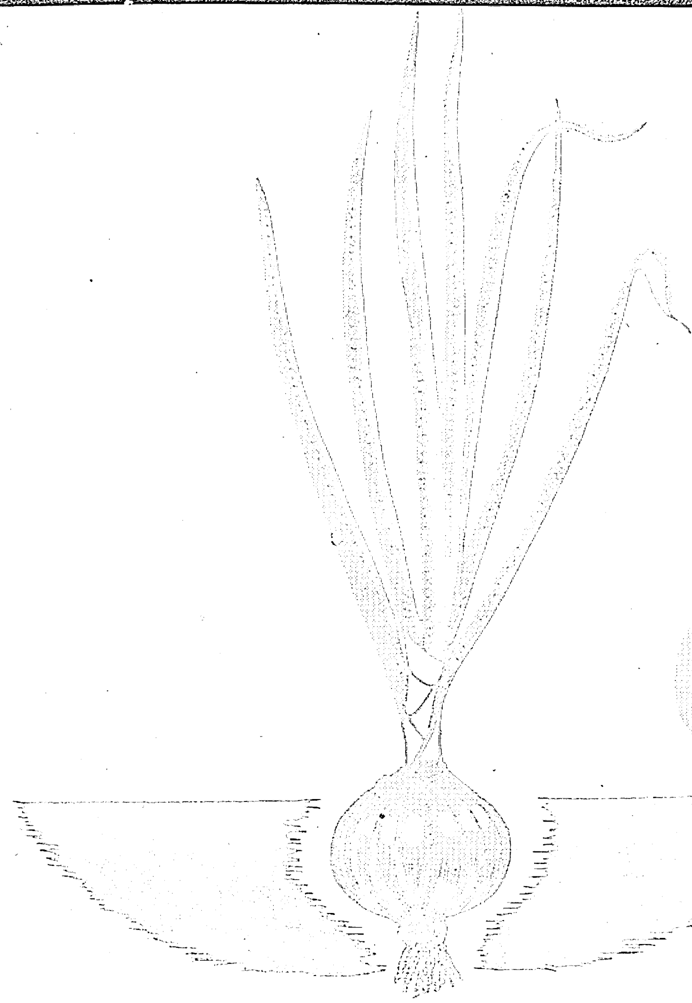
(*Contd. from page 6*)

I may again repeat that expert advice should be sought in the utilization of chemical fertilizers. But a minimum dose of about 200 lb. per acre is not likely to do any harm in any case. Whether it should be ammonium sulphate or super-phosphate or any other fertilizer mixture is for the Department of Agriculture to say for any particular area. Steps are being taken to see that chemical fertilisers are available not only by way of taccavi but also at prices as low as possible.

The talk about the soil having lost its fertility is, in my view, a totally false cry. But if it is at all true of any area, let us make an effort to put fertility back into the soil. All that needs to be done is an honest effort and, as has now been demonstrated, a little effort is capable of paying very rich dividends.

Another suggestion I have to make is in respect of establishment of nurseries for the preparation of seedlings according to the Japanese method. I think officers of the State Departments of Agriculture, village panchayats and public workers may probably be able to encourage the preparation of these seedlings by selected cultivators in a village or even in a group of villages so that others may be able to purchase them. In my view, it is wrong to belittle the importance of the raised seed-bed and the strong and healthy seedlings it produces.

Knowing the high seed-rate in India, we had recommended a cautious seed-rate of up to 20 lb. per acre. We are in a position now to say that almost nowhere the seed-rate need exceed 10 lb. per acre, and this is a fact of very vital importance as our stocks of good seed are limited. If we utilize the available quantity of good seed at the rate of 60 to 150 lb. per acre, it will cover only a small portion of our area. If, on the other hand, we resort to the Japanese method on a large scale, our good seeds will go from 10 to 15 times as far and also yield more healthy seed for the next year.



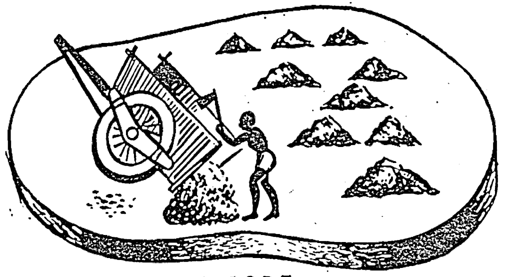
HOW TO GROW ONIONS*

FOR growing onions two things need to be done:

1. Raising a nursery
2. Cultivating the crop in the main field

RAISING THE NURSERY

The land selected for nursery beds should be rich, well-drained, and free from weeds. Sandy loams are the best.



1 ACRE

The area should be dug or ploughed and left for weathering for 10 to 15 days. It should then be worked to a fine tilth. All weeds and dead roots should be removed. The area should then be covered evenly with well-rotted cattle manure at the rate of 10 cartloads per acre.

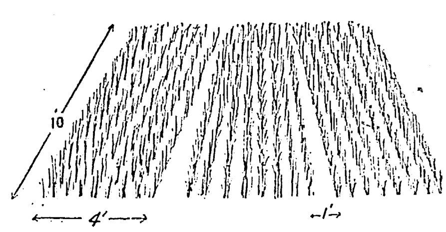
Seed beds, 4 ft. × 10 ft. in dimensions and raised three inches above the ground level with about one foot space between the beds, should be formed. The interspace is useful for easy watering, weeding and handling of seedlings.

Three to five days before sowing seed, two pounds of ash mixed with 100 lb. of well rotted, powdered farmyard manure should be applied to the beds.

The nursery bed should be sown about $1\frac{1}{2}$ months before transplantation.

The surface of the seed-bed should be kept friable.

Normally two pounds of seed of good germination capacity sown in about 300 square yards of the seed-bed will be quite sufficient for planting an acre. Since onion seed



is light and small, sand should be added to secure uniform distribution. Careful hand-watering with a rose-can is essential.

Where this is not possible, the surface of the seed-bed should be covered with straw or twigs and light splash irrigation given. Covering of seed-bed is also essential when there is rain. Daily hand-watering is recommended till the

* *Reproduced from I.C.A.R. Information Pamphlet series.*

first three weeks as even a little carelessness will lead to loss of seed.

Stagnation of water in seed-beds causes rotting of seedlings. It should, therefore, be avoided.

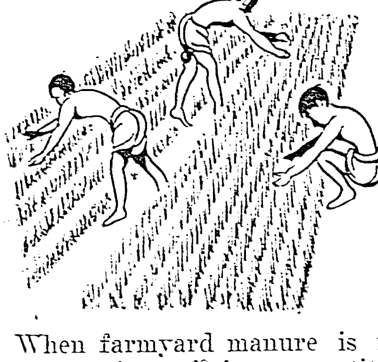
The seed-beds should be weeded at weekly intervals carefully without disturbing the seedlings. The seedlings will generally be ready for planting in six weeks when these are approximately six inches tall. When rank growth of seedlings is noticed, an inch or two of the top of the leaves should be nipped before trans-plantation.

At the time of lifting the seedlings the beds should be sufficiently moist so as to allow the seedlings to be pulled out with roots intact. This operation should be carried out during cool hours.

CULTIVATING THE CROP IN THE MAIN FIELD

The field should be ploughed to a fine tilth. Depending upon the previous crop and the nature of the soil, four to six ploughings will bring the land to the desired tilth.

Well-rotted farmyard manure at the rate of 25 cartloads per acre should be applied. If farmyard manure is not available, penning 5,000 sheep per acre or applying 10 cartloads of pig manure or 25 cartloads of night-soil compost or green-leaf compost or tank silt is advisable. Along with farmyard manure 200 lb. superphosphate and five cartloads of wood ash per acre may be applied and ploughed in as this has a good effect on the development of bulbs.



When farmyard manure is not available in sufficient quantities, 400 lb. ammonium sulphate per acre may be applied as a top-dressing a month after planting.

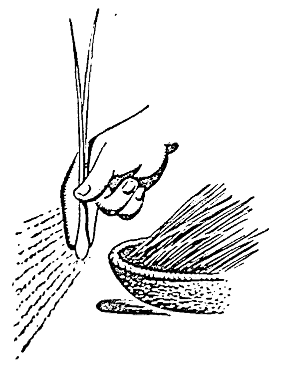
Onion crop is established in the field in three ways:

1. By raising seedlings in nursery and transplanting them
2. By planting bulbs
3. By broadcasting or drilling seed in the main field directly.

Transplanting seedlings is best as it results in high yields and the production of large-sized bulbs. Drilling or broadcasting seed direct in the field results in low yields and is, therefore, not recommended. Planting bulbs does not give as high yileds as transplanting but is inevitable on hill slopes as seedlings there are liable to be washed away during rains.

When transplantation of seedlings is adopted, the beds should be irrigated first and then the seedlings should be planted. Seedlings should always be planted singly.

Where bulbs are used these should be dibbled. For planting an acre you will require about 750 lb. of medium-sized bulbs. Bulbs harvested from a crop planted with seedlings alone should be selected for seed bulbs. These should be medium to small in size, ripe and healthy. Planting large-sized bulbs leads to early flowering and low yields.



SPACING

Seedlings or bulbs should be planted at a distance of four inches from each other. In heavier soils where ridges are formed, bulbs may be planted on either side of the ridge and also on the crest. Seedlings, however, should in no case be planted on the crest as most of them will die for want of moisture. Seedlings should be planted straight.

IRRIGATION

The irrigation required for the crop depends upon the following factors:

1. The time of planting

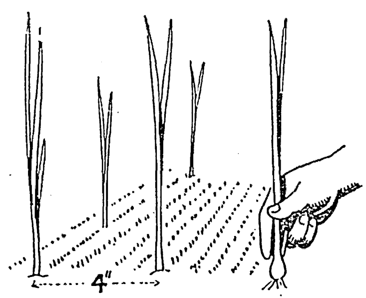
(*Contd. on page 32*)

HOW TO GROW ONIONS - - - - (*Contd. from page 30*)

2. The soil
3. The nature of planting material used, i.e., seedlings or bulbs

Onion crop planted between June and October requires only occasional irrigation. Crop planted in October requires more irrigation and the summer crop invariably requires irrigation at weekly intervals. Light soils require double the number of irrigations given in heavy soils.

The seedling crop requires light and careful irrigation till the seedlings are one month old. The first



irrigation should be given on the third day of planting and subsequent irrigations should be regulated by the moisture present in the top three inches of the soil.

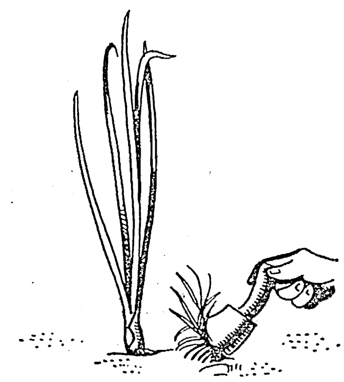
The June crop usually requires five to six irrigations, the October crop twelve to fifteen and the summer crop fifteen to twenty.

The final irrigation should be given two to three days before lifting of bulbs.

WEEDING AND INTERCULTURE

Generally speaking, the onion crop requires three to four weedings at 10 to 15 days intervals. In heavy soils hoeing is essential a week to ten days after second irrigation. The weak plants should be carefully earthed-up. During the south-west monsoon, the crop sometimes runs to rank leafy growth, and this can be prevented by trampling the crop under the feet. This operation should be carried out when the land is dry.

Bulbs begin to form about $2\frac{1}{2}$ months after planting and the necks of the bulbs are visible in large-sized varieties. These exposed portions of the bulbs should not be earthed-up as exposure to sun and air leads to better bulb development.

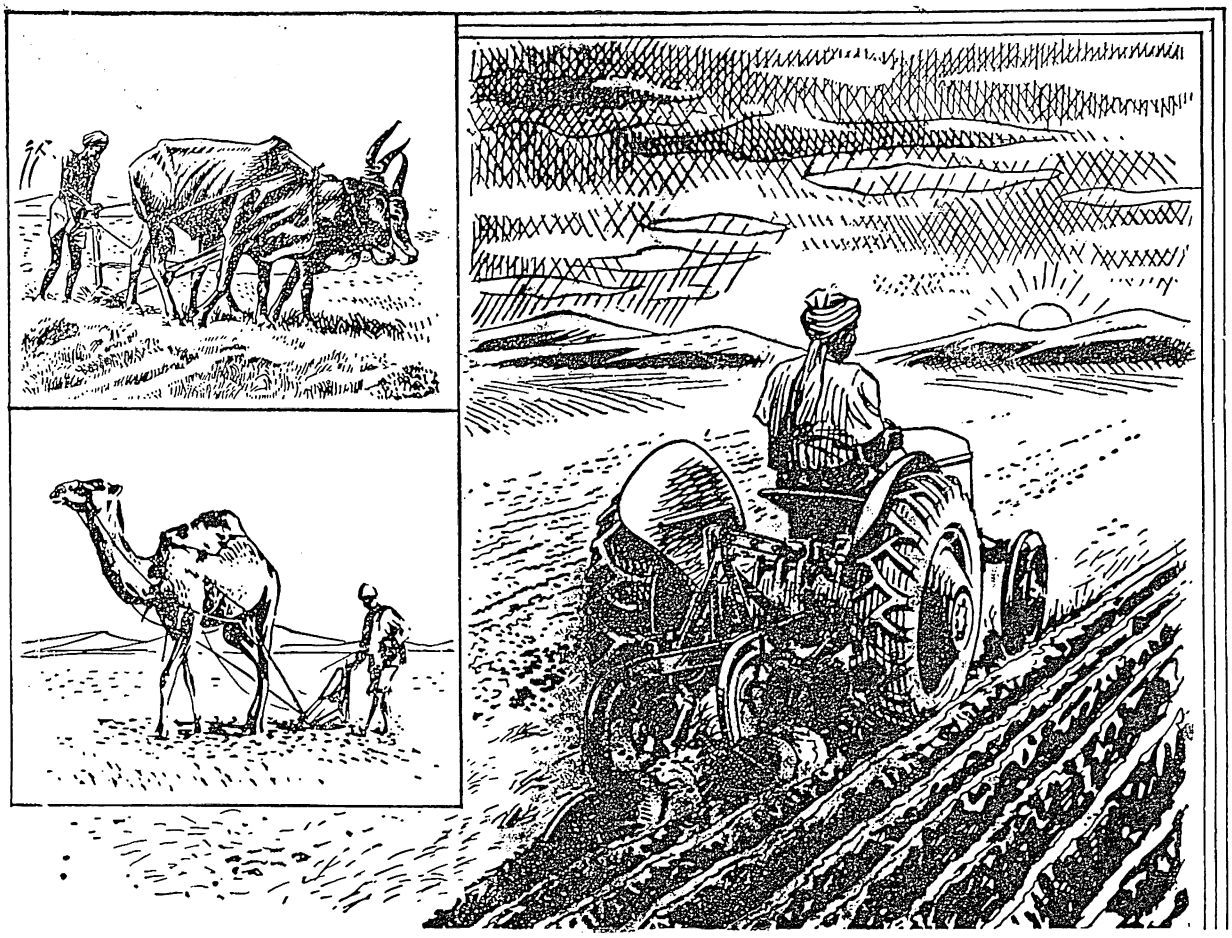


Flowering stalks should be nipped before the flower-heads are formed to help normal bulb development.

HARVESTING

The onion crop is generally ready for harvest about $3\frac{1}{2}$ months after planting seedlings or four months after planting bulbs. The leaves of the mature crop turn yellow from top to bottom and finally droop down.

Bulbs should be lifted carefully so as to avoid injury.



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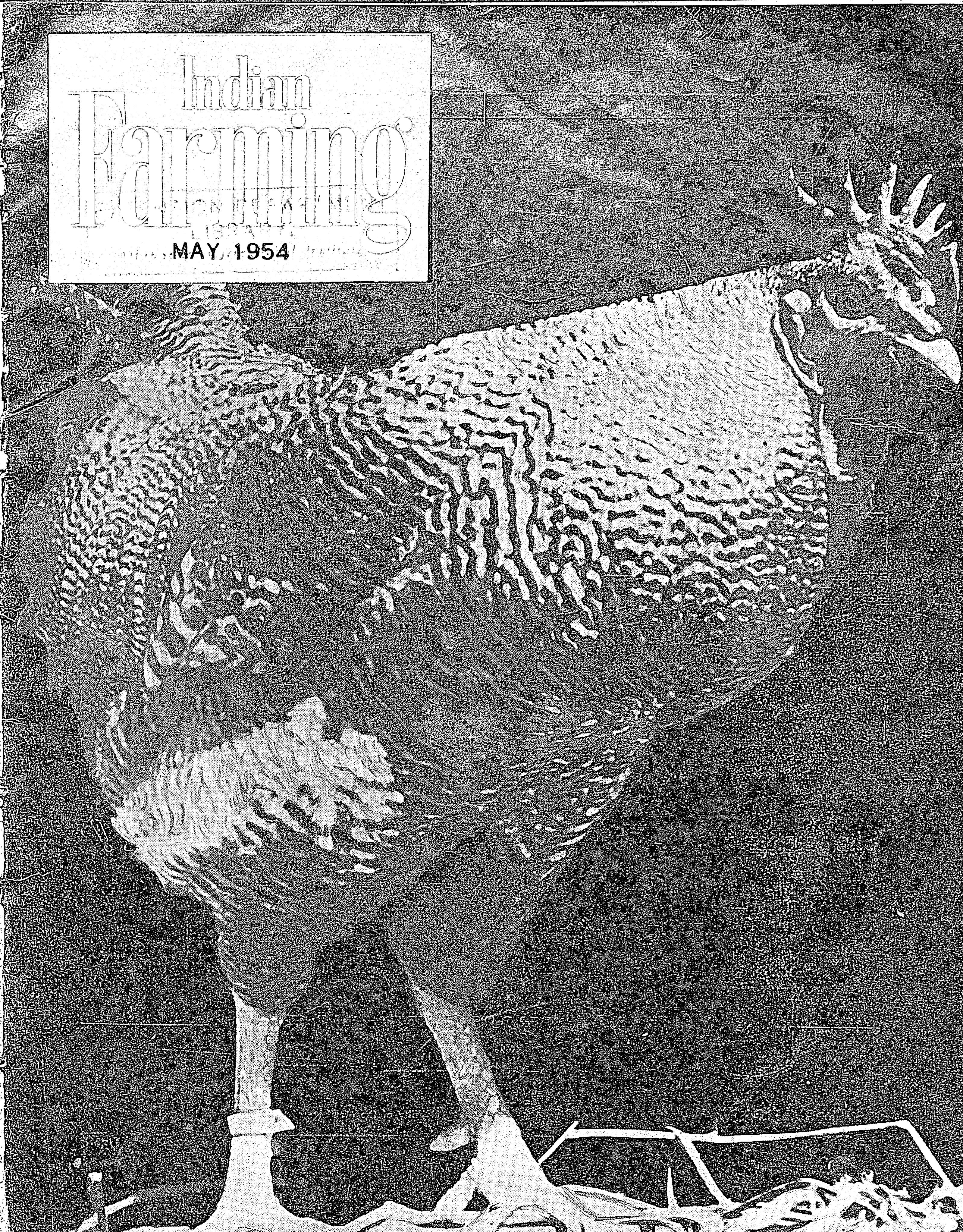

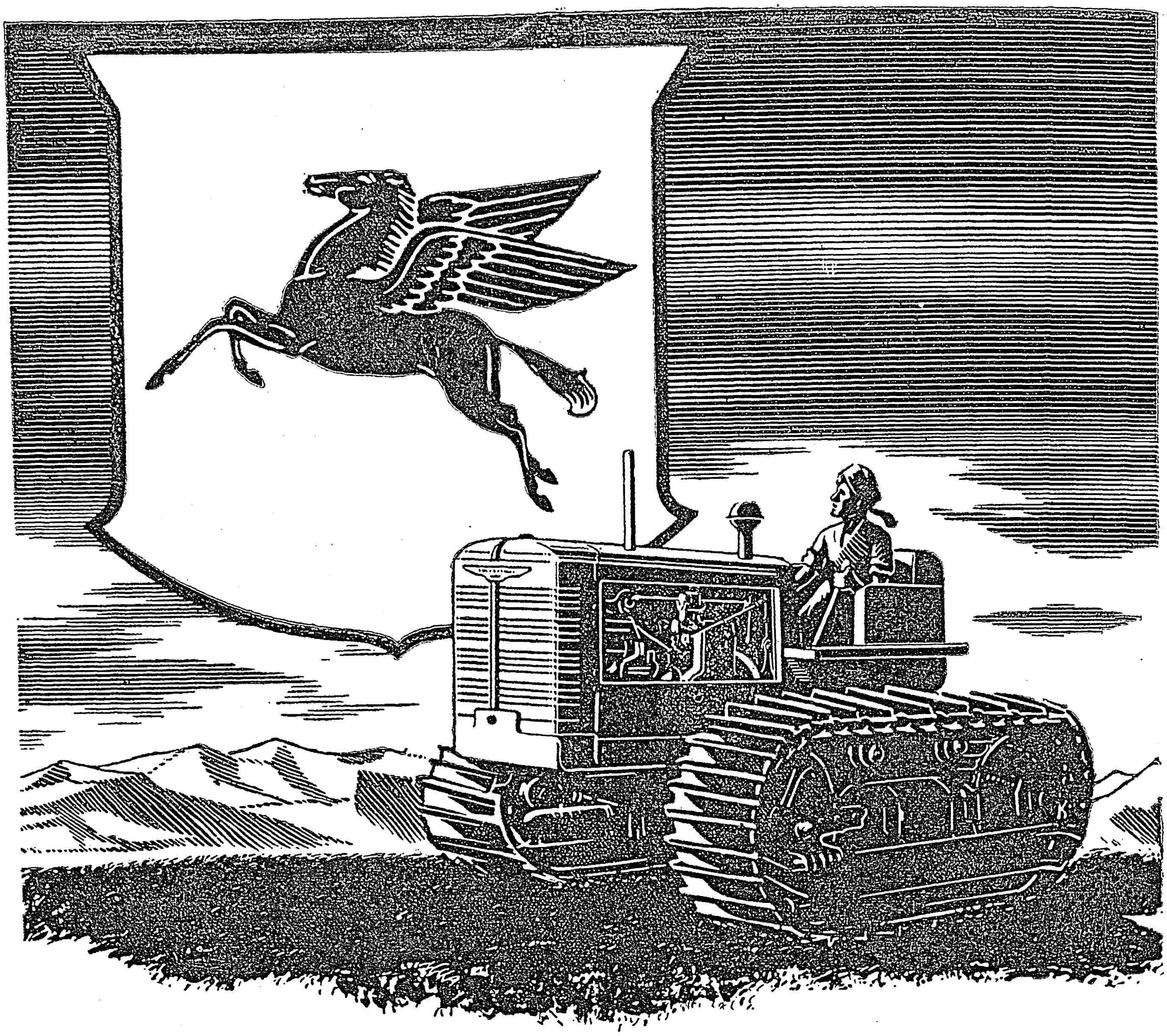

Indian Farming

Vol. IV MAY 1954 No. 2

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Printed at Swan Press of Lahore Sadar Thana Road, Delhi-6.

EDITOR'S PAGE

CATTLE SHOWS

FOR the first time this year, the All-India Cattle Show was held amidst rural settings and drew unprecedented crowds. The response from the exhibitors was also good, inspite of the several inconveniences they had to face. Both from the point of view of the number of cattle exhibited and the number of visitors to the Show, it was a great success.

The excellence of the various breeds exhibited proved that given the necessary "know-how" and the right incentive, the Indian stock-breeder could achieve very good results in breeding better cattle.

The improvement of cattle in the country has engaged the serious attention of Governments, both at the Centre and the States. But owing to several difficulties, the process is bound to take time. Of the many handicaps met with in cattle improvement work, none is more formidable than the general ignorance of the average villager in the right techniques of breeding, rearing and management of stock. Research is adding every year more and more results of practical importance in the field of animal husbandry, and unless these results reach the villages, the process of cattle improvement is bound to be slow. In the dissemination of information, especially when a majority of the people are illiterate, no medium can be as effective as a show or an exhibition. It is here that the rural visitor can see for himself what can be done in the work he is most vitally concerned, and carry back with him new ideas to the farmstead and the village.

Cattle shows can thus become an important occular demonstration of what can be done in cattle breeding and management. Apart from this educative aspect, it can provide the necessary incentive to do better with cattle breeding by inculcating a healthy competitive spirit amongst breeders.

Cattle shows can also be utilized for bringing to the notice of the villager what characteristics are most desired in each breed, and how to develop these characters in them. They can also be taken advantage of for telling the buyer what to look for in buying stock for the farm or the dairy.

Since cattle form an integral part of our agricultural economy, cattle shows can as well be used for demonstrating improved techniques of farming. The better the land returns, the better will be the condition of farm or dairy cattle. The demonstrations on improved farming methods held on the Bahadurgarh Cattle Show grounds this year were very instructive and well-attended.

The All-India Cattle Show Committee has shown what can be achieved through the holding of cattle shows on an all-India basis. The benefits of shows of this kind have to be extended to the far corners of the country, for creating in the people a sense of importance of raising the standard of our cattle, and also telling them how this can be done. This, however, can not be achieved by one organization alone. It is here that all those who have cattle improvement at heart can lend a hand to the State and make more shows and exhibitions possible in all the important cattle-breeding areas of the country.

MINERALS FOR MILCH COWS

By
DHARAM PAL,
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Dairy Farm, Chandigarh

WITH every pound of milk produced by the cow, it loses certain quantity of mineral substances. The more the quantity of milk produced, the greater is the draw for these minerals on the cow. Calcium and phosphorus are the more important minerals required.

Research workers in the United States have found that for the production of every gallon of milk, 7 grammes of phosphorus and 9½ grammes of calcium are required.

It is obvious, therefore, that milch cows should have adequate quantities of these minerals in their food. However, as milch cows are fed extra concentrates in the form of milk ration, they are unlikely to suffer from phosphorus deficiency, as the concentrates are normally rich in that element.

One deficiency dairy cattle may suffer from is that of calcium. On the military farms in India, this difficulty is got over by feeding the milch cattle with limestone daily. This is given when leguminous fodder does not form approximately half of the fodder ration for three months or one-fourth for six months.

Milch-stock yielding 10 to 40 pounds of milk per day receive one ounce of limestone for every gallon of milk produced by them and those yielding over 40 pounds a day receive 4 ounces of limestone.

Sodium chloride is another mineral necessary for milch cattle. If rock salt licks are provided for the cattle, there will be no chance of the animal body running short of this mineral.

Man of the Month

DECCAN FARMER WHO MADE FARMING PAY BETTER

Shri Dagdoo Ganpat Jadhav

IMPROVEMENTS THAT TURNED AN AVERAGE PIECE OF LAND INTO A MUCH-PRIZED FARM

SOME years ago, when the Bombay State Department of Agriculture wanted to select a farmer nearabout Poona on whose farm it could run a demonstration centre, the District Agricultural Officer had no hesitation in naming Shri Dagdoo Ganpat Jadhav of Kunjirwadi as the most suitable one.

The Department wanted such a farmer to be progressive in his outlook, ready to adopt improved practices suggested by the Department in his cropping methods, be able to understand and explain to fellow farmers the improvements brought about by him and make the farm available for holding demonstrations and farmers' meetings.

Dagdoo Jadhav, coming from a hardy stock of Deccan farmers, has been on farming all his life. 'When first I took up the Kunjirwadi farm some thirty years ago,' the sturdy sixty-one-year old farmer told me, when I visited his farm sometime ago, 'it was a parcel of land that you can come across anywhere in Kunjirwadi'. Kunjirwadi is about 20 miles from Poona, on the Poona-Sholapur Road.

Jadhav's farm, like other Kunjirwadi farms, has a soil varying from medium black to light and is of average fertility. The crops raised are, in order of importance, *jowar*, wheat, gram, maize, potatoes and peas. Crops get the benefit of canal water, and two excellent wells augment the water supply.

Farmer Jadhav was first fired with the desire to take to improvements when he paid a visit to the Poona Agricultural College and farms years back. Later, he contacted the extension officers for paying a visit to his farm and suggesting what he should do to do better with his farming. Within a few years by following intensive and timely cultivation practices he was able to get better returns from the land, and extend the area of the farm. Now it stands as a compact block of twenty acres.

The farmer, having set his heart on improved farming, gladly agreed to the proposal of the Agricultural Department to convert the farm into a demonstration centre for the taluka.

CONTOUR BUNDING

'The very first thing I was asked to do was to contour bund my entire farm', said Jadhav. 'I was told of contour bunding being one sure means of putting an end to soil erosion.'

One added advantage of such bunding which he could soon see on the farm was that the soil held water for a longer time, which ultimately benefited the crops.

Next the extension men drew up a new cropping programme for the farm to suit the soil and weather conditions.

According to this programme, the farmer was to follow this schedule :

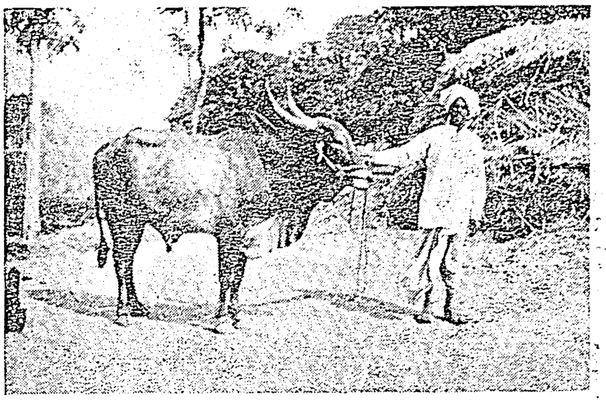
	First year	*Second year*	*Third year*
Kharif	Cereals	Legumes	Cereals and legumes
Rabi	Legumes	Fallow	Fallow
Hot-weather	Fallow	Vegetables	Vegetables

BETTER SEED

Farmer Jadhav has been convinced of the benefits of using improved seed for sowing. For *bajri*, he uses the well-known 'Akola' variety recommended by the Department. M-35-1 variety of *jowar*, Kenphad variety of wheat and chafa variety of gram are the other seeds used.

'I have watched the yields going up with the use of improved seed on the farm'. the farmer told me. 'On a rough estimate I can say that the seed has given me about 15 per cent increase in yields.'

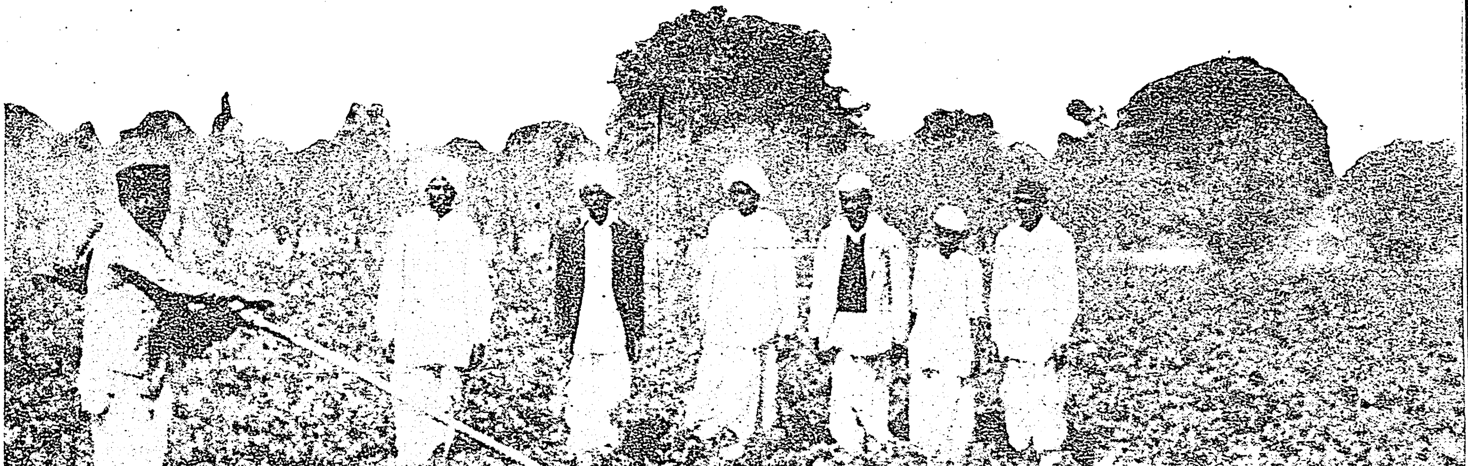
Visiting farmers have always been impressed with the good stand of crops on Jadhav's farm because of better seed. As a result, the demand for such seed has been on the increase. Last year, the Agricultural Department sold over 570 maunds of improved seed to Jadhav's neighbours.

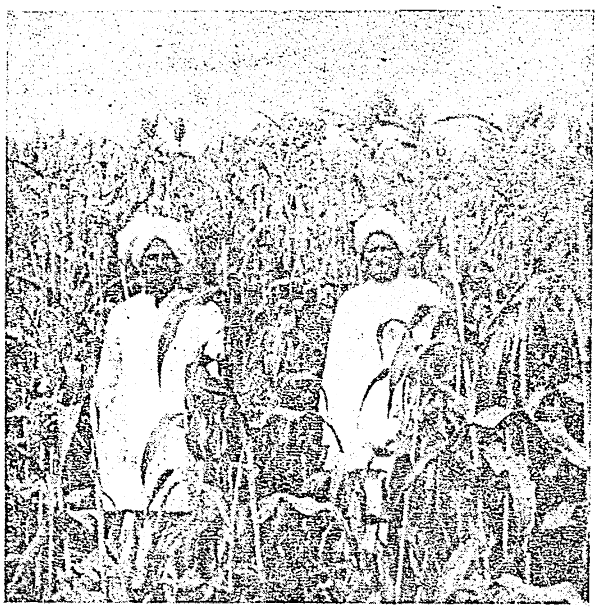


Dagdoo's son proudly shows the Khillar Bull maintained on the farm

The farmer's grandchildren love the farm animals, and like to feed calves and the poultry birds

A dusting demonstration in progress at the Kunjirwadi Farm





Father and son pose in front of the excellent crop of jowar they have raised

COMPOST FROM FARM WASTE

Jadhav is a great enthusiast of compost. 'There was a time when we did not know how to dispose of so much of crop waste that was accumulating on the farm Now composting has shown us an admirable way of disposing of farm waste, as well as enriching the soil with excellent manure.' he said. The farmer showed me the two pits he had dug, one of which had been filled.

Jadhav's neighbours are following this good example. 'You can see for yourself that composting has come to stay in Kunjirwadi. Over a hundred farmers here are regularly preparing compost from farm wastes', said the farmer with a smile.

Composting supplements the farmyard manure which Jadhav preserves with care. So do his neighbours. There are no unseemly dung heaps or pools of urine to be seen near the cattle shed. I asked him his experience about artificial manures.

'Five years ago' he replied, 'we did not know of artificial manures in this part of the country. I began, on the advice of the Agricultural Department, using manure mixture, ammonium sulphate and superphosphate for my grain and fruit crops with good results. Now these have become popular with other farmers as well.'

TREATED SEED

Jadhav has his seed treated before sowing. Sulphur treatment is given to *jowar* as a precaution against *jowar* smut and paddy seed is treated with perenox to guard against blast. Paddy, the farmer explained, was not a usual crop of the area. But the Department suggested a trial, and four years ago Jadhav tried paddy on his farm with very good results. Ever since then paddy has come into the cropping scheme of many of the farms of Kunjirwadi. Jadhav introduced potatoes last year, with equally good results.

GROWING PEAS

Peas are yet another crop recently introduced. The crop has been giving such a good stand and good returns that it is spreading fast in the neighbourhood.

'We were growing peas, and were very much discouraged by the results obtained. We used to get one picking from the crop with the yield at about 30 maunds', interrupted Jadhav's son, who is now at the helm of affairs at the Kunjirwadi Farm, 'but when the Department taught us sulphur-dusting against pea diseases, we could get as much as 200 maunds of green peas in six pickings'. In fact, peas were very much in evidence for miles around Kunjirwadi.

The farmer took me round his modest 1/2-acre orchard. Farmers here do have custard apples in ones or twos on their farms This farmer tried it on a ½-acre plot.

I was surprised to hear that this small bit of land bearing custard apples gave as much as Rs 3,000 a year to the farmer. 'Beyond giving a cartload of farmyard manure for every 20 plants, and copiously irrigating them, I hardly pay any attention to my orchard' he dislosed.

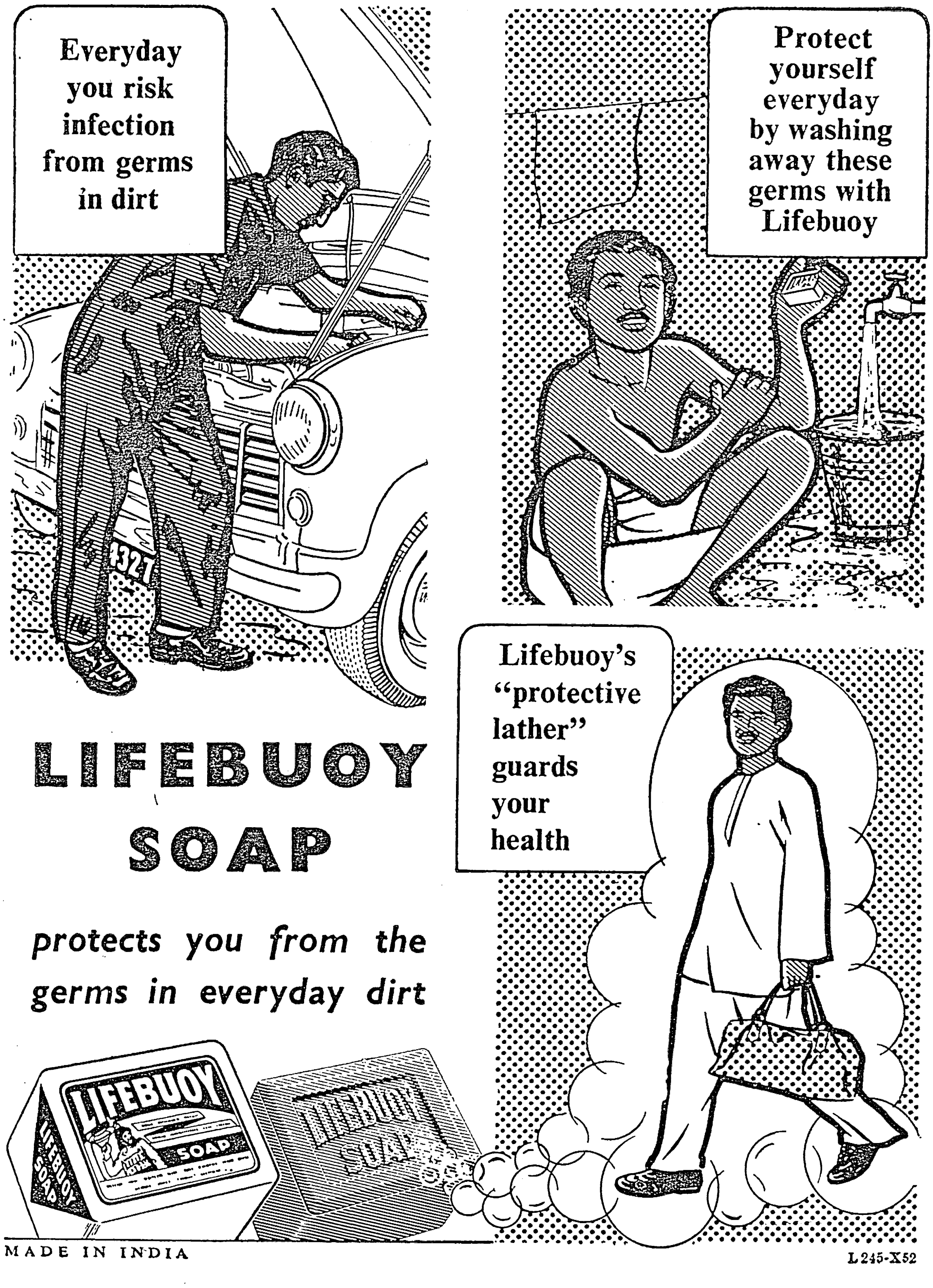
'I owe the high returns to my second son who is in Bombay' confessed the farmer. 'It is he who procures the best price for the produce. He is good in marketing farm produce.'

The farmer also showed me some old mango trees side-grafted. The side-grafts showed good flush. 'This is one of the most profitable things every farmer should know. It is as good as putting in a new life in an old plant', Jadhav said.

And lastly, farmer Jadhav showed me his prize possession. It was a Khillar bull, of very good proportions. It is being maintained by Jadhav for the benefit of the neighbourhood. His services are free.

Farmer Jadhav's Kunjirwadi farm is one of the most-priced farms in the area. He himself is held in great esteem by his neighbours, who seek the advice of this 'man of improvements' on agricultural matters. By taking to improved farming he has shown how farming can be put on sound lines. The Kunjirwadi Farm is a treat to see to all those who love farming.

M. G. K.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Insect Pests of the Coconut Palm and their control

By

E. S. NARAYANAN,

Head of the Division of Entomology, I. A. R. I., New Delhi

WITH about one and a half million acres under coconut, India has the second largest coconut-producing area in the world, yielding about 3,400 million nuts annually. Yet our production falls short of our requirements by about 25 per cent. One of the main causes for this deficiency is the serious damage caused by insect pests.

Although more than a dozen coconut pests have been reported in India, only three of them are considered of major importance. It must, however, be emphasized that even a minor pest is likely to assume the status of a major pest under favourable environmental conditions. It is the few that lurk here and there unobserved that multiply in geometrical progression and cause the major insect outbreaks. As Munro rightly observes, "One of the axioms of economic entomology is that, like the poor, injurious insects are always with us, and outbreaks of insects rarely arise by a sudden invasion from some distant quarter, but are the direct result of the steady increase of the ever-present but unobserved few."

The major and minor insect pests of the coconut palm are given below :—

Major pests :

1. The rhinoceros beetle (*Oryctes rhinoceros* L.)--Coleoptera: Dynastidae
2. The red palm weevil (*Rhynchophorus ferrugineus* Fb.)—Coleoptera : Curculionidae
3. The black-headed caterpillar (*Nephantis serinopa* Meyr.)—Lepidoptera : Crytophasidae

Minor pests :

1. Leaf-eating caterpillar (*Gangara thyrsis*)—Lepidoptera : Hesperiadae
2. Leaf-eating caterpillar (*Suastus gremius*)—Lepidoptera : Hesperiadae
3. Slug caterpillar (*Parasa lepida*)—Lepidoptera : Limacodidae
4. Slug caterpillar (*Contheyla rotunda*)–Lepidoptera : Limacodidae
5. Slug caterpillar (*Natada nararia*)—Lepidoptera: Limacodidae
6. Flower-eating caterpillar (*Turnaca acuta*)—Lepidoptera : Notodontidae
7. Flower-eating caterpillar (*Coconympha iriarcha*)—Lepidoptera : Gelechiadae
8. Flower-eating caterpillar (*Batrachedra arenosella*)—Lepidoptera: Cosmopterygidae
9. The bug (*Stephanitis* sp.)—Rhynchota : Tingididae
10. Scale insect (*Aspidiotus destructor*)—Rhynchota : Coccidae
11. Scale insect (*Vinsonia stellifera*)—Rhynchota: Coccidae
12. Scale insect (*Pseudaonidia trilobitiformis*)— Rhynchota : Coccidae
13. The red ant (*Dorylus orientalis*)—Hymenoptera: Formicidae
14. Termites
15. An unidentified aphid
16. An unidentified Scolytid beetle borer

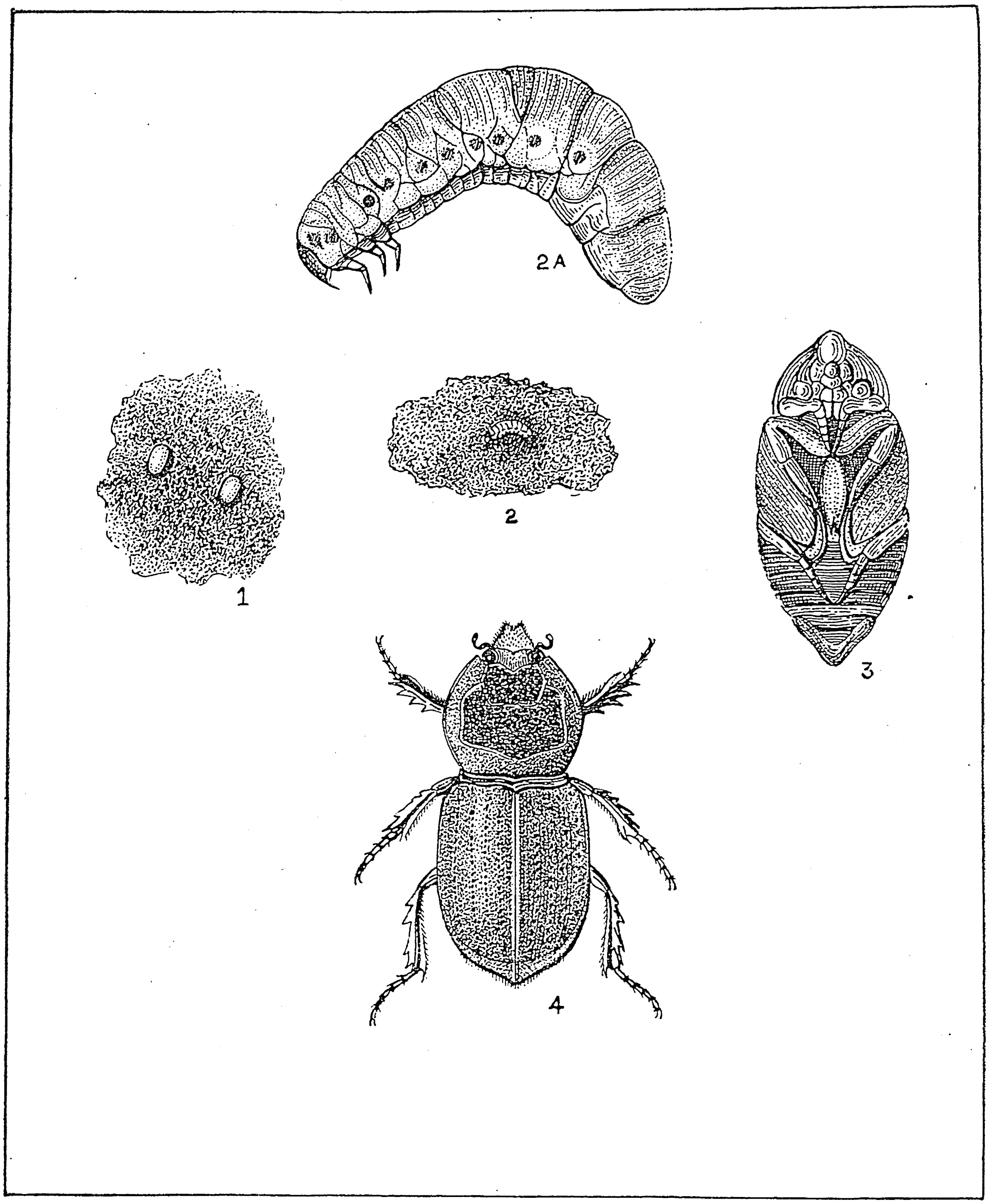
MAJOR PESTS

THE RHINOCEROS BEETLE

This is a serious pest of coconut as well as other palms throughout Travancore-Cochin, Madras, Orissa, Bombay, Saurashtra, Bengal and Assam. Outside India, the pest has been reported from the coconut-growing centres like Burma, Ceylon, Singapore, Java, Sumatra and the Philippines. A stout black beetle with a pointed horn, this pest causes serious damage by boring into the unopened fronds. The series of holes bored by this beetle are characteristic of the damage caused by it. When the damage extends to the growing point the tree dies off. The damage is most severe in the case of young plants, and the loss caused by this pest is sometimes really very great. It may be interesting to know that while the actual breeding of this pest takes place in the decaying vegetable matter, rubbish heaps, or farmyard manure heaped here and there in the plantations, the adult pest passes most of its life-time in the crown of the palm by feeding itself on its sweet sap.

Habits and habitat : The beetle lays eggs in clusters in manure heaps. Each cluster contains 48 to 152 eggs. The egg is 3 to 4 mm in length and 6 to 7 mm. in breadth. The incubation period varies from 10 to 15 days. The newly-hatched grub measures 6 to 7 mm. in length. The full-grown grub measures 75 to 125 mm. long and 20 to 30 mm. broad. Pupation takes place in the soil at a depth varying from six inches to four feet in the manure pits. Rarely a few grubs pupate in the crevices of the palm-trunk, inside a cocoon. The pupa is 50 to 70 mm. long and 20 to 25 mm. broad. The adult beetle remains in the cell for quite a long time after emergence, the period sometimes extending up to a month. It measures 35 to 50 mm. in length and 14 to 21 mm. in breadth and is conspicuous by its pointed horn, which is more prominent in the case of the males. The adult beetle is long-lived and has been observed to live for six months. The females start laying eggs 20 to 60 days after emergence and always select some decaying organic matter for oviposition. The larval period varies from 75 to 152 days and the pupal stage lasts from 15 days to one month. The palmyra palm, the toddy palm and the oil palm are its important alternate hosts.

Control measures : The rhinoceros beetle presents a very baffling



ORYCTES RHINOCEROS L.

1. Eggs
2. Freshly-hatched larva

2A. Full-grown larva

3. Pupa
4. Beetle

problem not only to the coconut industry but also to the entomologists entrusted with the task of effectively controlling the pest. The most effective and suitable method of its control is a very controversial subject and much research work has yet to be done, especially on the ecological studies of the beetle before we can formulate suitable control measures. Up till now more stress has been laid on preventive measures. More attention has been paid within recent years on the use of the recently discovered organic insecticides like BHC and DDT for the control of the pest. Nirula and others have found the use of BHC very effective for the control of the beetle grubs. As regards biological control, a green Muscardine fungus, *Metarrahizium anisopliae* Metch. is known to parasitise the grubs of this beetle and is reported to have been used with success in Ceylon as an effective means of controlling this pest, but the attempts so far made by the Kayangulam Research Station have not yielded any encouraging results. The introduction and establishment of some exotic predatory Scolid wasps from Malaya and Zanzibar offer perhaps a promising method of controlling this pest.

THE RED PALM WEEVIL

The red palm weevil is probably the most destructive pest of coconut and other palms. Toddy drawers, by the cuts that they inflinct on the palm to draw liquor, unconsciously help this pest in its attack. The initial damage caused by *Oryctes rhinoceros* also helps the pest in whose evil company it is oftentimes observed. It is reddish-brown in colour and cylindrical in shape. It is widely distributed throughout Southern India, Assam, Kanara and Bombay. The weevil has also been observed at Pusa (Bihar). Outside India, it has been reported from Ceylon, Sumatra and the Philippines. In the Indo-Malayan region a similar weevil, but of different species, is also found.

Unlike the rhinoceros beetle the whole life of this pest is spent on the palm tree. If a cut is not available to facilitate the start of its life-cycle, the female would scoup out a small hole by means of its snout on the softer portions of the stem and lay an oval whitish egg in the cavity thus caused. As a matter of fact, several such eggs are laid in separate holes. When these eggs hatch out, the small grubs start feeding on the soft tissues of the tree and often cause a very severe damage, at times killing the tree outright. The decaying organic matter of the dead trees affords the growing grub a very suitable medium for its development and ultimate emergence as an adult. The Indian species breeds throughout the year and has been observed in different localities at different times. On an average, the life-cycle occupies about two months.

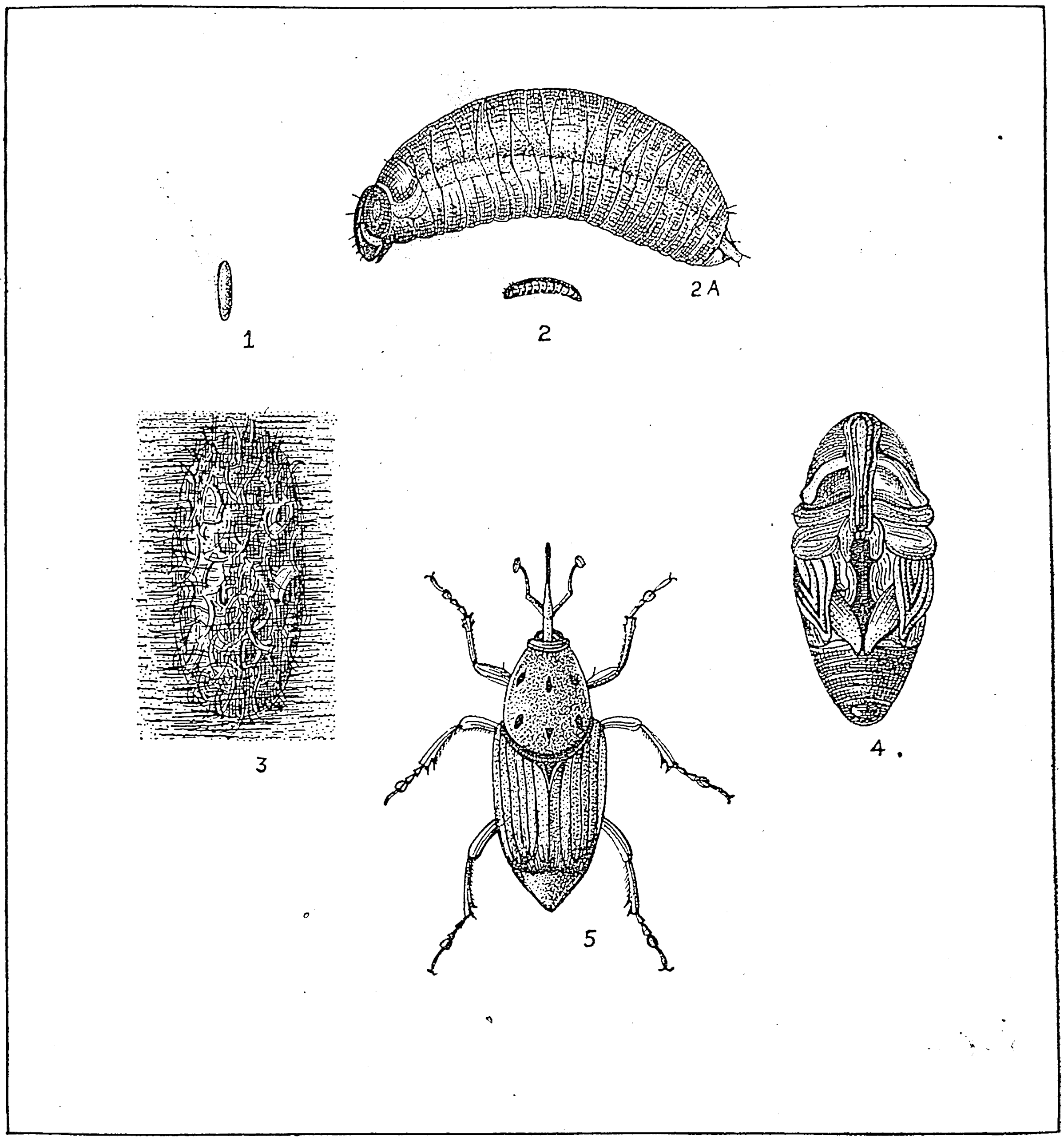
Habits and habitat : The egg which is 2.5 mm. long and 1.25 mm. broad is shiny, creamy white and oval-shaped, and is laid inside a hole scouped out in the palm. The eggs hatch in three to four days in summer; in winter the incubation period lasts a little longer. The freshly-hatched grub is 3 mm. long and pale yellow in colour with no legs. The full-grown grub is as big as 75 mm. in length and 20 mm. in thickness, and is a match to the stately, tall, coconut tree. The full-grown larva builds an oval cocoon under which it pupates inside the stem and the pupa measures about 30 to 32 mm. in length. It generally takes 18 to 33 days for the grub to develop into an adult beetle. The adults are shy of light and are capable of long-distance flights. They are known to live up to a period of about three months. In South India, the weevils have been found getting an easy access to the soft hearts of the tree about the month of May when the rhinoceros beetle is still doing damage. The insect is more common on the date and sago palms, and as compared to the rhinoceros beetle, is found in less numbers on the coconut palm.

Control measures : The method of control so far adopted is almost similar to that of the rhinoceros beetle as they are generally associated together. A great field for further research also exists in exploring its natural enemies and studying the possibilities of the biological control of this pest. The use of DDT and BHC may also be a useful adjunct to the other methods of control. But further experimental work in this direction is absolutely necessary before they can be recommended as a routine extension method to control the pest.

THE BLACK-HEADED CATERPILLAR

This pest is found on the coastal plains of South India, from Konkan to Travancore in the west, and from South Madras to Northern Circars, Orissa and Bengal in the east. In the north, it has been reported up to Patna (Bihar). The pest is fortunately absent in the Mysore Plateau. It is also a serious pest in Burma and Ceylon. It is a micro-moth of the family Cryptophasidae and causes extensive damage to the coconut fronds while in the larval stage, oftentimes bringing about a steep fall in the production of nuts. It also causes the nuts to fall from the trees when they are still young and immature. The larvae of this pest feed on the lower surface of the coconut fronds under galleries of silk which the caterpillar spins. When the attack is serious, the whole frond turns grey and the tree looks completely scorched up. Fortunately, the damage caused by it is localised and hardly a tree is found to die completely due to its attack alone. The period of the maximum development and activity of the pest is from April to May and the pest thrives well during drier months. The moths are ashy-grey in colour and usually rest on the under-surface of the leaves. They are fairly active after dusk.

Habits and habitat : The female moth usually commences egg-laying within a day or two of its emergence and the eggs are invariably laid on the under-surface of the pinnate leaves in scattered clusters numbering from 100 to 350. Each egg measures 0.3 to 0.6 mm. and is elliptical in shape and yellowish in colour. The hatching period is about four days in summer and six to eight days in winter. The freshly-hatched larva is about 1.5 mm. long and pale white in colour, while the full-grown larva measures 18 to 20 mm. in length and 2 to 2.5 mm. in breadth. The larva moults five times before it pupates and the larval period occupies about 36 to 54 days. Pupation takes place in the larval gallery under a whitish silken cocoon. The pupa which is brown in colour is 9 to 10 mm. in length. The pupal period varies



RHYNCHOPHORUS FERRUGINEUS FB.

1. Egg
2. Freshly-hatched larva
2-A. Full-grown larva
3. A cocoon in the stem of a palm
4. Pupa
5. Weevil

from 9 to 12 days. The female moths genarally live up to six days. The whole life-cycle covers 55 to 78 days. Besides the coconut, it has got many alternate hosts of which the palmyra, the talipot and the wild date-palm are worth mentioning.

It may be emphasized that this pest was first discovered in Madras in the year 1902 on palmyra leaves in the vicinity of Coimbatore only, and in spite of the enforcement of the Madras Agricultural Pest Act of 1919 it has gradually spread on the western coasts of the densely coconut-cultivated areas of Mangalore, Malabar and Travancore-Cochin. Steadily the pest has spread to Orissa and Bengal in the east, Bombay and Poona in the west and as far as Patna in the north. It is thus evident that this pest is capable of spreading rapidly over wide areas and today the loss to the coconut-growers is considerable on account of the depredations of this pest.

Control measures : The gap in our knowledge on the control of this pest is rather wide, excepting that this pest has got a number of natural enemies that normally keep it under check. The only method that can be recommended is to cut down all infested fronds and destroy them. This method though found fairly satisfactory often leads to re-infestation by this pest. The only course left, therefore, is to mass-breed some of the promising parasites like the *Perisierola nephantidis* (larval) or *Trichospilus pupivora* (pupal) and liberate them when the infestation is very high. Spraying of infested plants with 0.2 per cent DDT is reported to have given satisfactory results. It must, however, be emphasized that this insecticide has to be used with great caution as otherwise it will also destroy the beneficial parasites.

The parasite fauna on the east coast comprise mainly of :

(1) *Apanteles taragamae* (Braconidae)—larval

(2) *Perisierola nephantides* (Bethylidae)—larval

(3) *Elasmus nephantidis* (Elasmidae)—pupal

and 4) *Stomatoceras sulcatiscutellum* (Chalcididae)—pupal

The parasite fauna on the western coast comprise mainly of :

(1) *Trichospilus pupivora* (Eulophidae)—pupal
(2) *Microbracon brevicornis* (Braconidae)—larval
(3) *Elasmus nephantidis* (Elasmidae)—pupal

MINOR PESTS

Very little is known about the minor pests as these have not so far caused any appreciable damage to the coconut palm. Therefore, a brief and passing survey about each of these pests is made below :

Gangara thyrsis : This is a leaf-eating butterfly caterpillar occasionally found feeding on the folds of coconut leaves, especially on young plants. Removal of badly affected leaves in young plants is the only suitable method of control known so far.

Suastus gremius: This is a pest, chiefly of the palmyra palm, but occasionally found on the coconut also. Hand-picking of the larvae in young plants is the only suitable measure of control.

Parasa lepida : This is a leaf-eating slug caterpillar that sometimes causes serious damage. At times even large palms are affected by this pest. Cutting and destroying of the affected branches is a good method of control.

Contheyla rotunda : This is also a leaf-eating slug caterpillar, the larva damaging the foliage and sometimes the flower shoots and rinds of young nuts. This pest is very common in certain parts of South Malabar and Cochin. Cutting off of the attacked fronds is a good method of control.

Natada nararia: This is another leaf-eating, spiny slug caterpillar doing some damage to the coconut palm. It is more common in the Godavari delta.

Turnaca acuta : This is a minor caterpillar attacking flowers.

Coconympha iriarcha: This caterpillar also attacks the flowers.

Batrachedra arenosella: This also causes the same damage as the above two.

Stephanitis sp. : This is a lace-wing bug, occasionally found on tender leaves. It appears in very small numbers and the damage caused is usually negligible.

Aspidiotus destructor : This scale insect probably occurs throughout the coconut-growing tracts in our country. Sometimes it appears in very large numbers, literally covering the leaves. The vitality of the tree seems to be lowered when the incidence is very high. Careful spraying with some of the modern organic insecticides is perhaps a suitable method that can be taken recourse to for combating an outbreak of this pest.

Vinsonia stellifera : This is also a widely distributed scale insect sometimes appearing in small numbers on the coconut palm.

Pseudaonidia trilobitiformis: This scale insect has not been reported in India so far. The pest was recorded in Colombo on one occasion. As Fletcher says, it may be found in our country also.

Dorylus orientalis : These red ants attack young plants just in the same way as termites do, and can be treated similarly as the latter.

Termites : These are sometimes serious pests of young coco-palms, especially in Malabar. A judicious use of DDT or BHC may perhaps be useful to exterminate this pest. Watering the young plants with a little crude oil emulsion can also yield useful results.

An unidentified aphid : This unidentified aphid was only once found on the young coconut palms at Coimbatore, possibly imported from Colombo. This was, however, promptly controlled.

An unidentified Scolytid beetle borer : This unidentified Scolytid beetle bores into the stem of the coconut palms and is more common in the Negapatam and Godavari districts.

Very recently Nirula and others have recorded a new Cockchafar beetle pest of the coconut palms. As this has been reported for the first time and only very recently, it is difficult to categorise it as a major or minor pest.

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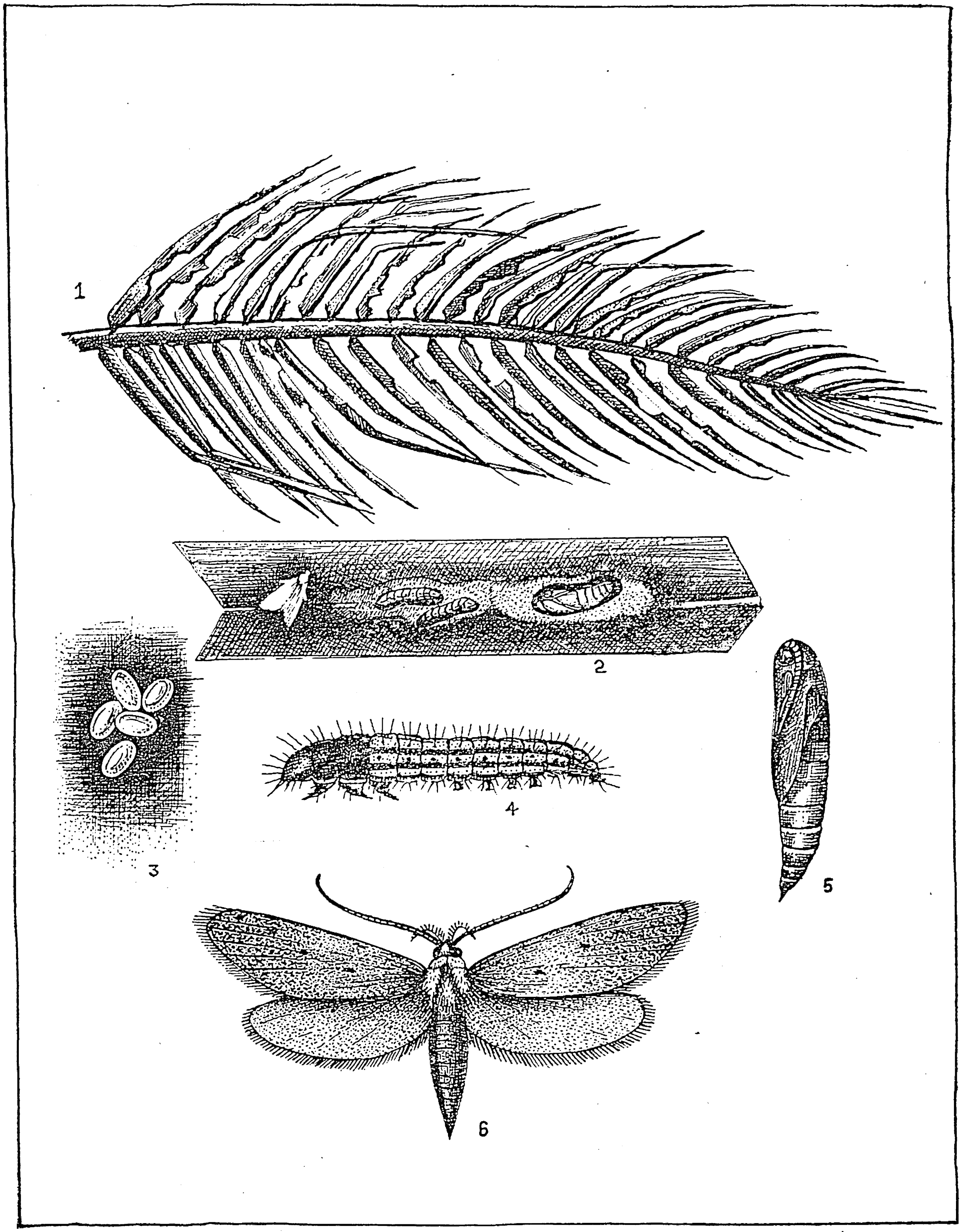
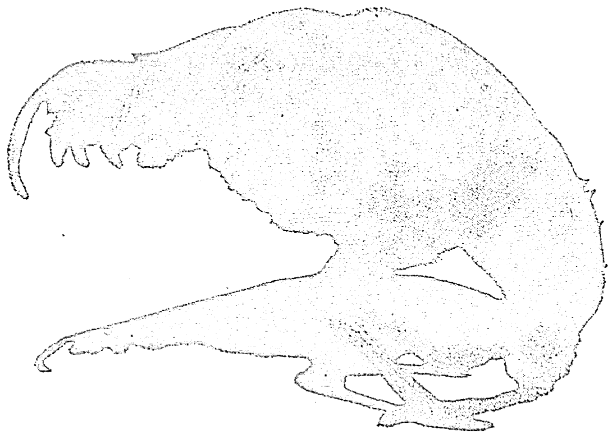


NEPHANTIS SERINOPA MEYR.

1. An attacked frond
2. A section of the leaf showing galleries spun by the caterpillar, a cocoon and a moth
3. Eggs
4. Caterpillar
5. Pupa
6. Moth



A bird suffering from the after-effects of Ranikhet

Bang The Door On Ranikhet

Ranikhet kills fowls as easily as it spreads

By
KARAM CHAND
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DURING the hatching season of October to April, a large number of fowls in the Punjab succumb to Ranikhet.

The disease has been found to be as serious as it is common. It spreads quickly, is malignant in its nature and causes heavy losses. With the onset of summer, however, it slowly disappears, to appear again in its favourite season next year. In the hills, where the temperature is low and humidity high, the disease occurs even during summer.

Ranikhet is one of the four major diseases attacking fowls in the State. The others are fowl pox, tick fever (Spirochaetosis), and worm infection (Helminthiasis).

The average poultry-keeper labours under the conception that the local breeds are less susceptible to Ranikhet than imported ones. Observations, however, show that indigenous breeds are as susceptible to the disease as imported ones.

In many cases, the poultry-keeper is unable to distinguish between a broody hen and one sick with disease. In both cases, the bird prefers seclusion.

But a careful observation can easily show the poultry-keeper whether a bird is suffering from Ranikhet or not. A bird that has had infection gets high fever, suffers from acute respiratory distress, diarrhoea and partial paralysis of the limbs.

The disease infection is spread through food and water, mainly the latter. In the course of a few days, the excretions of the birds add to sources of further infection. The scratching habit of the birds also helps in the quick spread of the disease.

Sometimes carcasses of birds infected by the disease are eaten, and the unconsumable parts fed to household flocks. Infection generally reaches a healthy flock through broody hens and newly-purchased birds coming from infected areas. Once the disease is introduced in a flock, it spreads rapidly, indicated by a quick succession of attacks and deaths among the birds.

Ranikhet in the flock lasts for weeks at a time, and when it stops, hardly a fowl is left behind.

The disease, however, can be kept out of the flocks by taking proper preventive precautions. Treatment is also available through vaccines. No outbreak of the disease has been reported in systematically vaccinated flocks. Poultry-keepers should take effective preventive measures and keep disease incidence down in a pretty short time.

CANE-GROWING NEEDS TO BE IMPROVED

THE Indian Union possesses two distinct sugar belts, one lying in the tropics and the other in the sub-tropics, the latter possessing the largest area and the heaviest concentration of factories and producing three-fourths of the total sugar in the country.

The sugar industry in India has grown up tremendously since the last few years. Since 1931, the number of factories has risen from 32 to 139 and output from $1\frac{1}{2}$ lakh tons to 12 lakh tons. It is today the second largest national industry, next only to cotton textiles.

In the country, 22 to 25 per cent of the crop is converted into white sugar, the balance being used for *gur* manufacture after meeting the requirements for seed, chewing and stock-feed.

The irrigated acreage under sugarcane varies from 36 to 100 per cent in the various States. Adequate irrigation facilities are necessary to improve production level and ensure proper utilization of manures and fertilizers applied.

Of the total crop grown, barely 18 per cent is manured. Sugarcane areas in Madras are well off in this respect while in this regard Uttar Pradesh and Bihar need to supplement supplies of oilcakes, compost, green manures, etc.

All over the world, sugarcane production has been very largely raised by imbibing scientific improvements. In India, the largest cane acreage lies in the sub-tropical north, where holdings are small, and the grower poor. However, the size of the holdings need not be a bar to high yields, provided the farmer uses good seed, gives adequate and timely cultivation and proper manuring to the crops and takes care to maintain the fertility of the soil.

The industry in Bombay has the unique feature of possessing its own estates and these have shown what the wedding of science and capital can achieve.

Bombay has shown improvements both in acreage and sugar recovery; Madras only in acreage and Uttar Pradesh and Bihar, in sugar recovery but not acre-yields.

The average duration of the factory season has varied from 86 to 234 days, the minima fixed for the sugar belts of the north and the south being 120 days and 200 days respectively.

The by-products of the sugar industry are being only partially utilized and considerable scope exists to develop them towards cheapening the cost of manufacture.

Cattle S

Sahiwal cows of the President's Bodyguard Dairy at the Show

By **P. L.** Jaiswal

ABOUT 600 head of cattle, representing 19 breeds and 50 sheep and goats were on show at the Twelfth All-India Cattle Show held at Bahadurgarh, 18 miles north-west of Delhi during March last. The number was probably the biggest ever to be seen in any show of the kind held in recent years.

The Show, organised for the first time in a rural location, attracted large crowds of villagers, the last day alone accounting for over a lakh visitors.

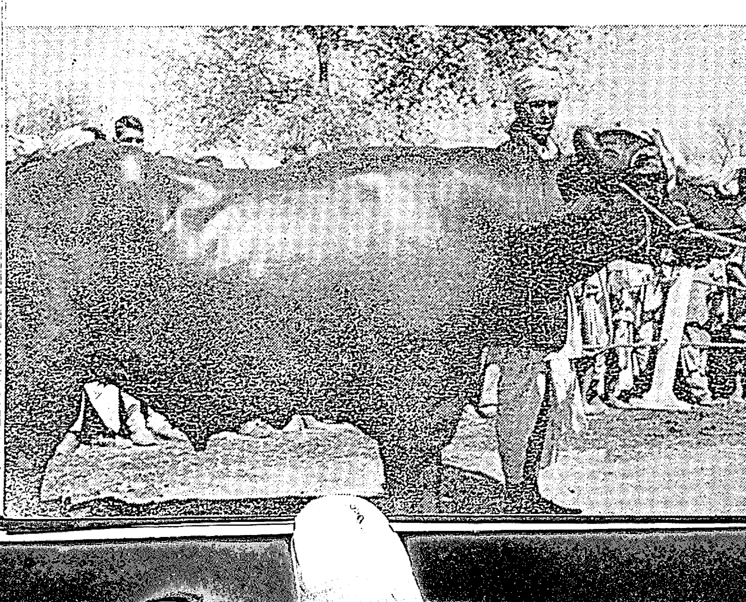
The Show was inaugurated by Dr. Punjabrao Deshmukh, Union Minister for Agriculture, who appealed to the people for a fuller co-operation in nation-building activities such as the development of cattle in the country.

An interesting feature at this year's exhibition was the chain of demonstration centres on improved agricultural and animal husbandry practices. Demonstrations on improved cattle and poultry breeds, preservation of meat and eggs and fish culture in ponds were also conducted.

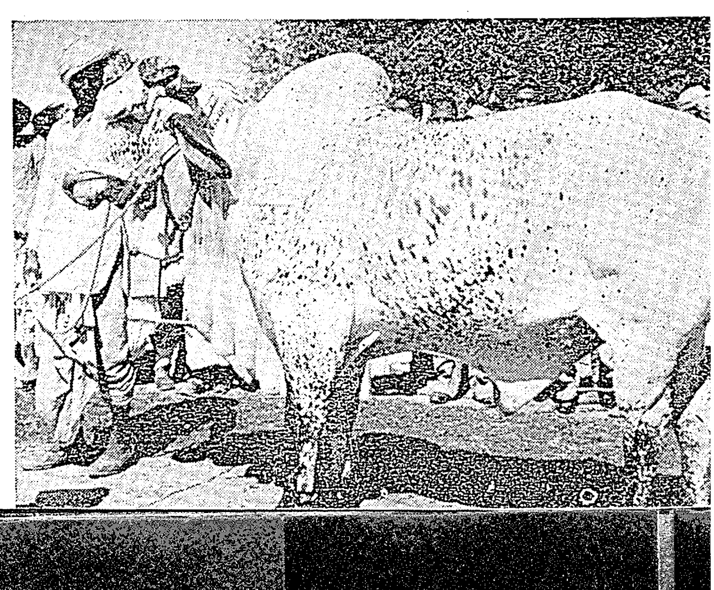
Demonstrations on the Japanese method of paddy cultivation and improved method of sugarcane cultivation were held for the benefit of farmers.

The stall of the Central Inland Fisheries Research Station was equipped with aquaria, charts and diagrams and exhibited the method of cultivation of some of the major carps like *'Rohu'*, *'Katla'* and *'Mirgal'* in small village ponds.

The Murrah buffalo which was declared the Best Animal at the Show.



The Deoni Bull that shared honours with the Murrah buffallo as the Best Animal of the Show



how at Bahadurgarh

At the poultry demonstration centre, inexpensive incubators, thatched poultry-houses and methods of preserving eggs and canning chicken were effectively demonstrated.

CATTLE SECTION

Practically all the important breeds of cattle were exhibited at the Show. These included the Red Sindhi, the Deoni from Hyderabad, Gir from Saurashtra, Hariana from the Punjab and Delhi, Hallikar from Mysore, Nagori and Rath from Rajasthan and Ongole from Andhra. Two breeds of buffaloes, the Murrah from the Punjab and Delhi and Nilli/Ravi from the Punjab and PEPSU were entered in the Show.

The selection of the Champions and Supreme Champions *viz.*, best buffalo-bull, best buffalo-cow, best bull, best cow, best animal in the Show and also the highest milk-yielder and best draught type bullocks was done during the last two days, and a running commentary of the proceedings helped breeders and visitors in understanding the characters of the various breeds of cattle and the progress made in the judging of cattle. A draught test was held for the first time this year for ascertaining the pulling capacity of bullocks.

PRIZES AWARDED

Prizes were awarded to the best animals in the various breeds, the Champions and Supreme Champions. In all, three gold medals, 78 cups and Rs. 18,276 in cash were distributed to the winners in the various competitions.

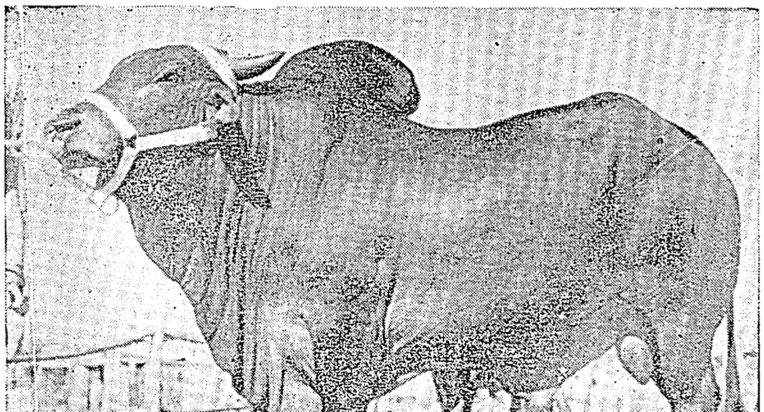
Best animal : 'Lakshmana', a black and white mottled Deoni bull and a Murrah buffalo-bull from Rohtak were the recipients of the title of 'Best Animal' in the Show. The judges found it difficult to choose between the two, and accordingly the award of Rs. 2,000 given by the Central Council of Gosamvardhana was equally divided between the owners of the two bulls.

Besides the above mentioned award, Shri Raghunath, the owner of the Deoni bull got the Marquess of Linlithgow, Hyderabad, Bharatpur and the Times of India Challenge Cups and also cash prizes amounting to Rs. 950. Shri Haradwari Lal, Sarpanch of Gobhana Panchayat to which the Murrah buffalo-bull belonged, also received the Marquess of Linlithgow, Saidulla Khan, Lyallpur and Macguckin Challenge Cups and Rs. 750 in cash on behalf of the Panchayat.

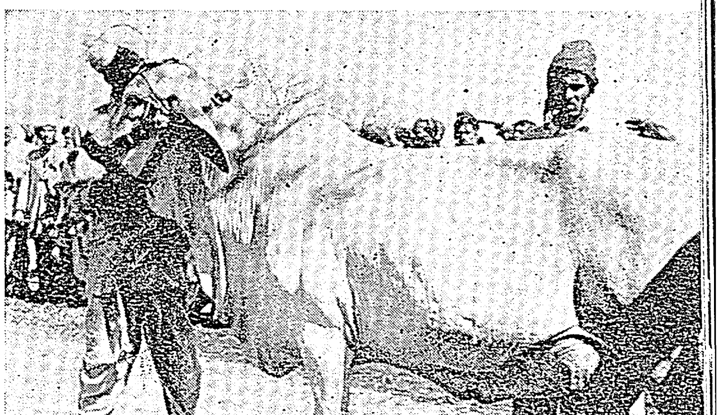
The 3½-year old Deoni bull, 'Lakshman', was graceful and strikingly impressive. It had a well-proportioned body, a robust constitution, an intelligent expression and a majestic bearing. Its massive forehead, drooping ears, fine skin and heavy dewlap were the most characteristic and impressive features. The proud owner of 'Lakshman', Shri Raghunath, told me that besides *kadbi* and green fodder, he fed 3½ seers of gram, cotton-seed, etc. and a little jaggery and salt to the bull every day He said that the bull was capable of serving 100 to 125 cows per month, and that he was charging Rs. 10 per service, and after meeting all the expenses he was able to save Rs. 800 to 1000 per month during the breeding season.

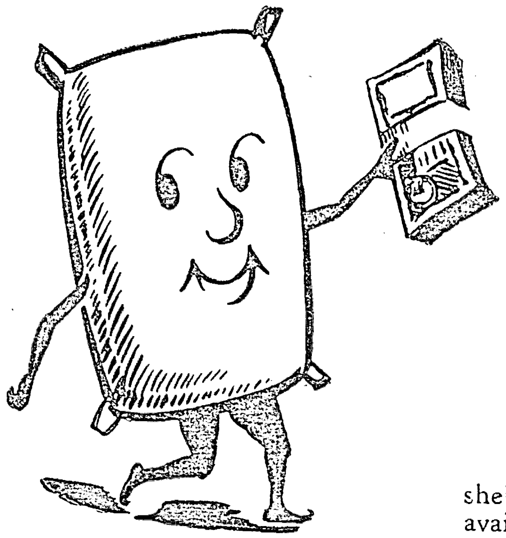
(*Continued on page 29*)

This bull, declared as the best animal of the Red Sindhi breed is from the Military Dairy Farm, Hebbal, Mysore State.



The Hissar Cow that was declared the Best Cow in the Show.





Better Price for Farm Produce

FARM produce does not generally fetch as much price as it should. This is primarily due to lack of proper marketing methods. Efficient marketing alone can help the producer to realise a greater share of the price the consumer ultimately pays for the produce.

For the creation of an efficient market, individuals and organizations will have to work in close co-operation with each other. The farmer, the trader, the consumer and the Government have to put their shoulder together to the wheel.

WHAT FARMERS SHOULD DO

Farmers can assure a better-quality produce by harvesting the crop at the proper stage. As a clean produce fetches a premium in the market, it pays to have produce such as foodgrains and oil-seeds free of chaff, dirt and foreign material. Clean picking of cotton gives a clean lint which fetches more money. Commodities like fruits and vegetables bring better prices if graded before sale.

Some produce requires proper processing for a good market. Paddy has to be hulled and sold as rice, groundnut shelled and sold as kernel and *kapas* ginned and sold as lint. The paddy husk, groundnut shell and cotton seed will also be available as by-products and can be put to such use as fuel, manure and feed.

Market rates are broadcast on the radio, published in papers and put up in many *mundies.* A producer who knows the trend of the market for the various commodities knows when and where to sell his produce with advantage. He will know from the current prices whether he stands to gain by selling his produce locally or by taking it to another market.

Regulated markets guarantee a fair deal to the producer, where open auction and use of standard weights are practised and market charges are pegged down. It pays any producer to take the produce to the regulated market.

Since most farmers are small-scale producers, organizing themselves to pool, process, grade and market their produce on a co-operative basis will be ideal. In this work, they have all support from the Government.

Traders can definitely play an important part in raising marketing standards. They should change their operating methods and take to improved processing of goods, adopt standard contract terms and evaluate the goods on a standard quality basis.

GOVERNMENT'S ROLE

Government's aim is to help those who help themselves. It enacts market legislation. It provides marketing services such as grading and inspection and publicising market news, assists producers' co-operatives, organizes publicity and widens export markets, conducts research on marketing problems and organizes an extension service to acquaint farmers, consumers and market functionaries with the improvements effected.

Consumers can help in bringing about marketing improvements by always insisting on Government-graded products. The success of the grading schemes depends on the full support they receive from the consumers. Look for "Agmark" on the products such as *ghee*, vegetable oils, eggs, fruits, etc. you purchase. "Agmark" symbolises purity and quality.

If you need advice on the marketing of farm produce, contact the Marketing Officer of your State or write to the Agricultural Marketing Adviser to the Government of India, New Delhi.

CORRECTION

March, 1954 issue of "Indian Farming"

The second sentence of the introductory para of the article entitled "Production of Chillies" appearing on page 20, may be read as

"The mild type used for salads, pickles, baking and stuffing is known as pepper, bell pepper or capsicum, or white pepper of commerce, which is derived from the berries of a tropical, woody plant, *Piper nigrum*, whereas chilli, *Capsicum frutescens* belongs to the family Solanacae."

Mixed Cover Crops For The Monsoon

WHERE POSSIBLE, IT WILL PAY FARMERS TO TRY MIXED CROPS DURING THE MONSOON SEASON

MIXED cropping in the monsoon season has four-fold advantages to offer to the farmer. The interspace in the crop is better utilised, cost of interculture is reduced and the moisture conserved in the deeper layers of the soil after the *kharif* cereal or cotton crop is harvested. Mixed cover crops also bring larger profits to the farmer.

Among mixed crops, combinations with *jowar* and *bajra* are more common than with maize when raised for grain. In northern India, *arhar* is the principal companion crop to *jowar* yielding an average of about 12 maunds per acre. *Arhar* has a deep taproot system and as such, makes use of the sub-soil conserved moisture. It also enriches the soil due to the continuous leaf-fall and release of nitrogen from its root nodules' and also makes phosphates available for the next crop.

Moong and *urid* are sown mixed with the *jowar* crop on the lighter types of soils in Uttar Pradesh, Bihar and Madhya Pradesh.

In South India, *moong*, red gram and *urid* are commonly sown mixed with *bajri*, *kodra* and *ragi*, particularly in the drier parts of Madras, Mysore, Hyderabad and Bombay States. In northern and southern Gujarat, as winter rains are seldom received, mixed sowing of *arhar* or castor in rows eight to ten feet apart is practised.

In Madras State, experiments have shown that the combination of the pure *cumbu* crop followed by horse-gram and the combination of red gram mixed with *ragi* followed by horse-gram, give the highest outturn per acre.

In Mysore, groundnut is cropped mixed with *jola*, castor, *sejje* or *tugari* and cotton. Here varieties of a short duration are preferred for such cropping. Raising *ragi* with field bean is also a common practice.

In Bengal, jute is sometimes sown with *aman* paddy. When rice is a subordinate crop and is raised on dry land, it is usual to mix it with *kharif* cereals or *kharif* pulses. The variety of rice used is hard and is able to withstand drought.

The Italian millet is perhaps the most important of the crops grown as companion to short staple cotton, Among pulses, horse-gram is common in Mysore. *maccai* in the Surat tract, green gram, black gram and red gram in Madras State, and green gram and black gram in Hyderabad (Deccan), Madhya Pradesh and Madhya Bharat. In these three States, groundnut as a mixed crop is getting more popular.

In view of the benefits that mixed farming has to offer to farmers, it is advisable that wherever facilities exist, a better cropping system is adopted and better returns obtained from the land in addition to raising the standard of fertility of the soil.

Extracted from "Double cropping"
(I.C.A.R. Review Series No. 8)
by P. C. Raheja

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS.
ADDRESS THEM TO THE EDITOR, "INDIAN FARMING"
INDIAN COUNCIL OF AGRICULTURAL RESEARCH,
NEW DELHI.

Sardar Ram Singh of Rithora poses with the harvest that brought him a per-acre yield of 120 maunds

JAPANESE SYSTEM IMPRESSES Madhya Bharat Farmers

By
S. M. WAKANKAR,
Economic Botanist to Madhya Bharat
Government, Gwalior

Farmers adopting the Japanese system raised bumper yields of paddy in Madhya Bharat last year. As in the rest of India, the Japanese system has been demonstrated as an affective means of increasing rice-yields in this State too.

LAST year, rice was grown on 15,870 acres in Madhya Bharat by the Japanese system with very encouraging results.

Rice has a minor position among food-crops in the State occupying as it does about two lakh acres, as against 28 lakh acres under *jowar* and 20 lakh acres under wheat. Yet, farmers responded well to the campaign for popularising the Japanese system inaugurated in March, 1953 at Pipandi, a small village near Gwalior in the heart of the compact paddy-block in Gohad Tehsil.

As most holdings on which rice is grown in the State are large, the Japanese system was slightly modified to suit local conditions. For the irrigated crop, the dose of fertilizers recommended was 120 lb. each of ammonium sulphate, groundnut-cake and superphosphate, and for the rain-fed crop the dose was 40 lb. of each of these fertilizers.

Large-scale demonstrations held in all the rice-growing areas helped farmers pick up the technique of the new system easily. Demonstration plots alone covered an aggregate area of 1,532 acres. The salient features of the method such as growing seedlings on raised beds, transplanting seedlings in lines, fertilizer-application and timely and proper interculture of crop were stressed so that farmers could pay enough attention to each one of them. Farmers were supplied with 683 tons of the various fertilizers for application to their rice crops.

Further impetus to farmers to take up the system and pay proper attention to the crops was provided by holding a rice crop competition throughout the State. The entry fee was kept at annas four, so as to be within the reach of all farmers. In all, 507 farmers participated in the competition, and crop-yields were checked by a committee of five. Yields were recorded on 1/80-acre plots.

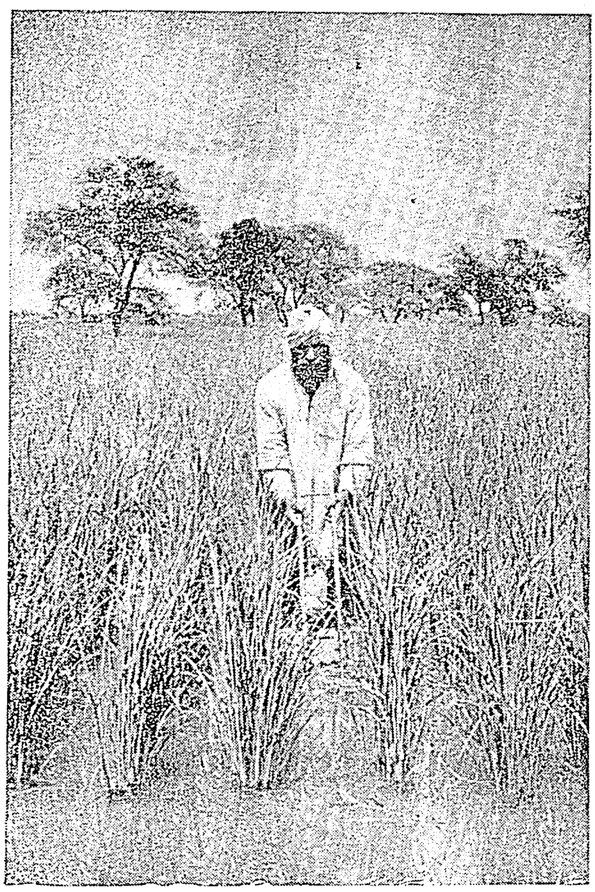
Sardar Ram Singh of village Rithora in Morena district topped the lists for the State by getting an acre-yield of 120 maunds of paddy, followed by Shri Devendra Singh of Birgawan, Gird district with 118 maunds and 10 seers, and Shri Kanhaiyalal Jagannath of village Shampur, Dhar district, with 115 maunds and 5 seers.

Seventy-two of the farmers were awarded prizes for the best performance in their own respective localities at the Convention held in Gwalior in January this year.

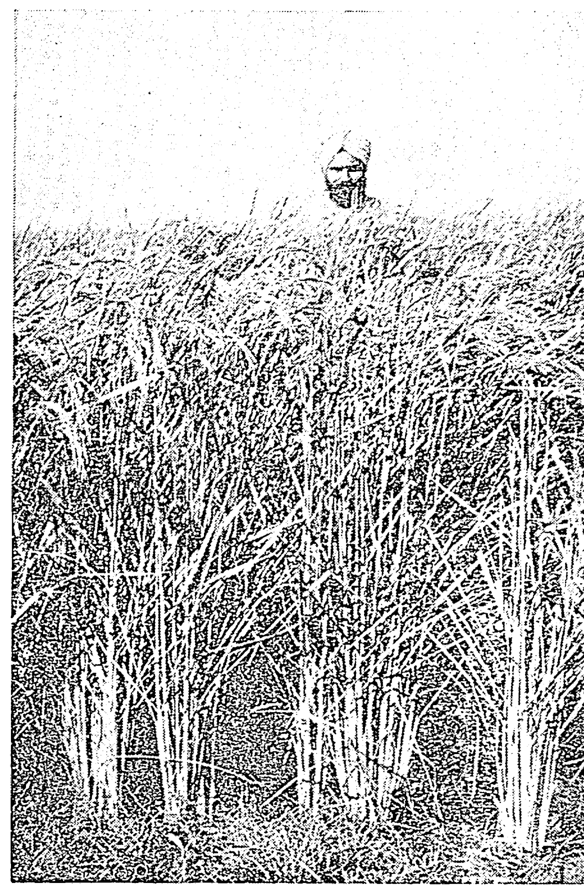
In Madhya Bharat, the Japanese method of rice cultivation proved a success during the last season. Preparations are afoot to push the campaign further in the coming season.

School children helped in holding demonstrations in the Gohad area

Interculturing paddy became popular wherever the system was introduced



A crop raised by the Japanese system in Harsi looked like this



TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

Editor

The Farm Home

Make the most of rice

The housewife should get the best out of rice by following a few easy precautions while cooking

IN a large number of Indian farm homes, rice forms the principal item of diet. Rice is in main a starchy food, giving the body the energy it needs. But that is not all. It contains other important substances too which are badly needed for building the body and keeping it in good health.

Take proteins, for example. Rice has comparatively a small quantity of proteins. These substances are required for growth and the maintenance and repairs of body tissues. Though the quantity of proteins in rice is small, they are in such form that they can meet the demands of the body better than the proteins in many other foods.

Rice, of cource, is poor in fats. But that should be no matter for worry, because fats can be easily had through other sources.

IMPORTANT NUTRIENTS

Of greater importance, however, are the vitamins. Vitamin A is a substance that the body must get in sufficient quantities for maintaining good health. Again, rice has such small quantities of it that the rice-eater has to rely on other foods to get a sufficient quantity of it. But rice contains a good quantity of another vitamin called vitamin B, a substance that the body requires badly. This vitamin is found more in the outer layers of rice and little in the starchy kernel, which is all that remains when rice is milled.

Rice is poor in calcium or lime, which is required, among other things, for the building of bones and teeth.

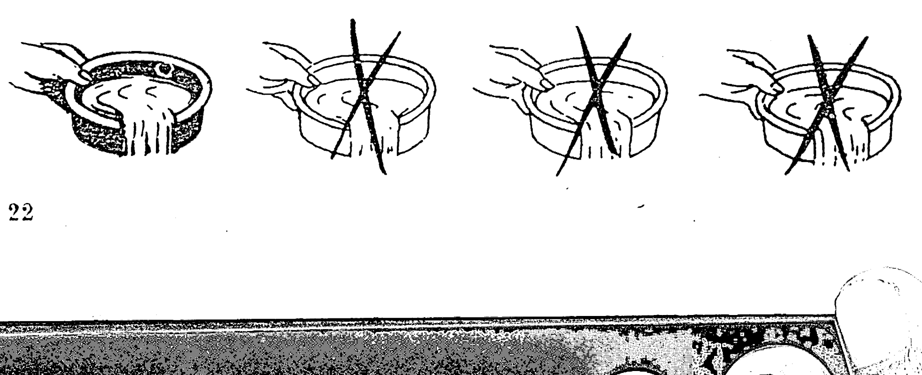
So here are the food factors of rice. Most of these factors are little affected by cooking. But many of them are soluble in water and can for that reason be washed out of food.

And here is where the housewife has to be cautious. She usually washes the rice several times before cooking, and she may even boil it in excess of water, and throw out the water.

Even with the first washing, substances like the vitamins pass into the water, which is thrown away. If rice were to be washed three times, and cooked with liberal amounts of water, much of the iron, almost half the phosphorus and some of the vitamins contained in it are lost.

REDUCE LOSSES

The housewife has, therefore, got to see that such loss of nutrient



substances is reduced to a minimum.

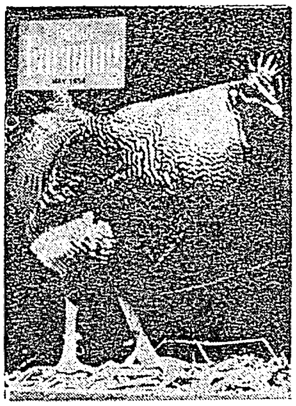
She will also have to remember that parboiled rice is more nutritious than raw milled rice. When rice is milled, it loses much of the proteins, mineral salts and vitamins, because, the 'germ' and the outer coat of the grain, which contain these, are removed in milling. In the steaming done in parboiled rice, some of the nutritive substances contained in the outer portions of rice get fused in the grain.

Under-milled rice again is more nutritious than milled rice. The ancient practice of hand-pounding of rice results in the retention of some of the nutrient substances, and hence hand-pounded rice is better than milled rice.

To get the best out of rice, therefore, let the housewife

- prefer hand-pounded or undermilled rice to milled rice
- prefer parboiled rice to raw rice
- reduce the number of washings of rice before cooking
- use less water for cooking rice
- not throw away the cooking water, but use it for other preparations, such as the pulse gruel.

THIS MONTH'S COVER



A Barred Plymouth Rock bird that got much praise at the recent Poultry Show held on the Cattle Show grounds at Bahadurgarh

BHATA SOIL need not be unproductive

MIXED FARMING PRACTICES AND PROPER GRAZING CAN MAKE EVEN POOR LATERITE SOILS PRODUCTIVE

THERE is new hope for the farmer who owns the laterite soil (*Chandal Bhata*) in Chhatisgarh in Madhya Pradesh.

The soil is proverbially infertile, and a poor crop of early varieties of grass, which withers away within a week of the cessation of the monsoon is a common sight on the soil, and occasionally, where the soil is a little better, the farmer raises some of the lesser millets.

Now, a system of mixed farming, tried at the Chandkhuri Farm under the State Government Dairy and Mixed Farming Scheme, is showing the possibilities of raising the fertility status of the soil to get better returns from the land.

Mixed farming helps to increase the humus content of the soil, with which it becomes highly responsive to irrigation. On the Farm, where the paddy yields have averaged 1,800 lb. an acre, last year, the yield rose up to 2,275 lb. an acre. The rise was due to the soil becoming more fertile as a result of the mixed farming followed.

LEY FARMING

Another method tried at the Farm for making the land more fertile was ley farming. According to this system, grasses are raised and the area closed for grazing for two or three years, following which the area is allowed to be grazed for a year, and then brought under grain or some other crop for the subsequent two or three years.

The 'Haveli' system also showed good results in improving the laterite soil. The entire run-off of the cultivated fields is caught and cattle allowed to wallow in it for two or three years. Thereafter the land is drained off and put under nutritious and high-yielding varieties of grasses as a cover crop for a few years.

PLANNED GRAZING

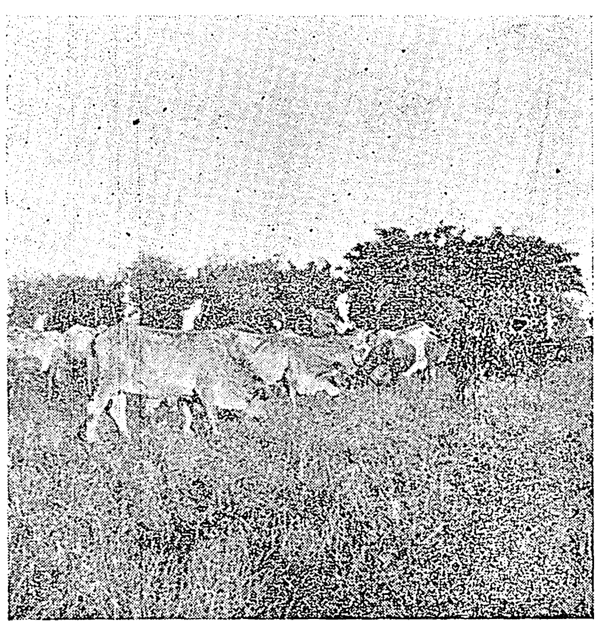
Planned grazing, as a part of grassland management is paying dividends. The grazing technique is to divide the grassland into blocks, and allowing cows to graze for the first four days in each block. Cows are fastidious about coarse grasses, which the buffaloes readily consume. Hence buffaloes follow cows for the next three days, and sheep follow next, browsing closely and thereby checking weed-growth in the block. This technique ensures full utilization of all varieties of herbage in the pasture. After each rotation, the pasture land is harrowed with a chain or spike harrow to spread cattle droppings.

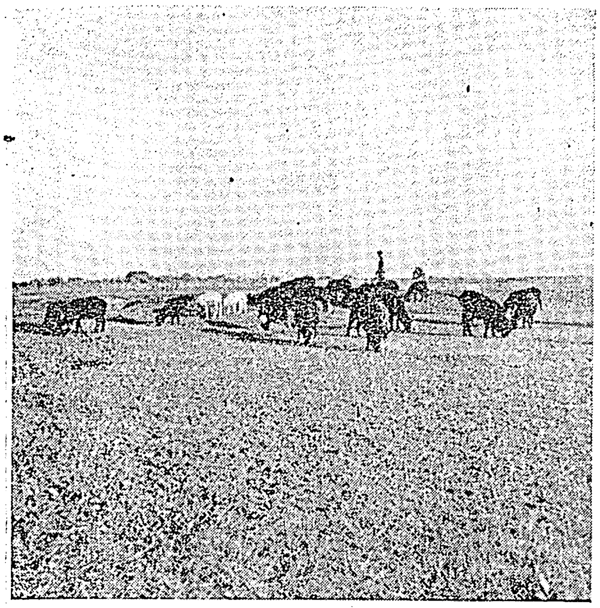
Grass is mowed in the close reserve. Attempts are being made to have two harvests : one for ensilage, and the other for hay or for grazing. The grassland of 170 acres on the Farm this year hasproduced enough to maintain 150 adult cattle for eight months in the year. Steps taken to increase the fertility of the soil, the grazing technique and other cultural operations followed helped in reaching this high standard.

Heifers of the Sahiwal breed maintained on laterite soils of this Farm are calving down at the

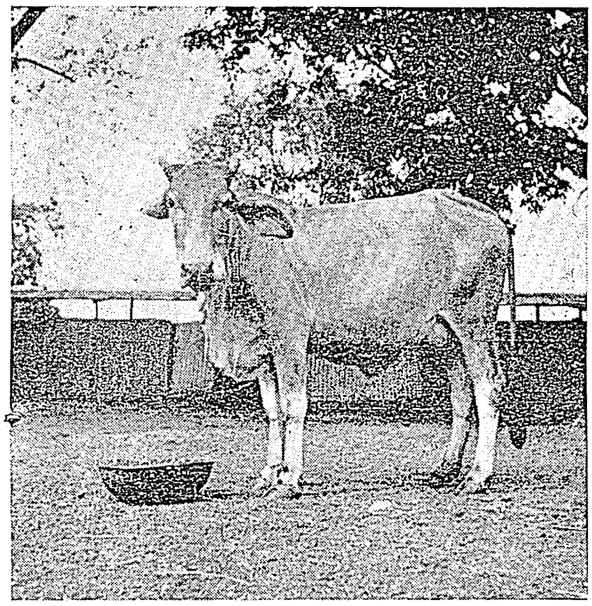
A fodder grass grown alongside a food crop

Cows grazing on the grass lands; buffaloes follow them next





Sheep follow the buffaloes; planned grazing is paying well at Chandkhuri



A Farm-bred Heifer; heifers on the farm calve earlier

average of $3\frac{1}{2}$ years and yield over 3,000 lb. of milk in the very first lactation.

The *Bhata* soil need not be dreadful any longer to the farmer if he follows the system of mixed farming, as demonstrated at Chandkhuri.

GOATS NEED GOOD FEEDING

Feed precautions to get better value from goats

By H. K. LALL

CERTAIN precautions taken in the feeding of goats can make them profitable animals to keep, whether maintained in ones or twos or in flocks.

In our rural areas, goats are maintained on grazing and browsing alone, occasionally the milk goats getting some concentrates. In the cities, they are mostly stall-fed, but are also sent out for picking what they can from loppings of trees and bushes. Then there is the poor individual who maintains a goat or two for milk. He tethers his animals outside his house, and seldom sends them out for grazing.

Goats do like browsing on small bushes and loppings of trees. But a reckless lopping of trees seen largely in villages will have a dangerous result. Much of the tree wealth is thus being destroyed, rendering many a fertile land into a barren waste. A judicious lopping or browsing of trees should be done if the life of the trees is not be jeopardised. Goat-keepers will do well to remember that by reckless lopping of trees they are hitting at their own existence.

When only a goat or two is maintained, it is best to tether it on a grassy plot where available. This can be done by means of a light chain or rope attached to an iron *khonti* driven into the ground. This tether must allow sufficient movement, say, for about 20 yards all round. The *khonti* can be moved to a fresh spot as and when necessary.

SUCCULENT FOOD

It is always advisable to furnish green grass or green leaves to goats every day as such succulent food helps them keep healthy as well as increase their milk-production. Leaves or grass in a wet condition, however, should not be fed fresh, but first dried and fed. Likewise, in the early monsoon, when the new grass is fresh and tender, it is dangerous to allow goats to eat very much of it at any one time. Such grass should be fed to them sparingly.

Where stall-feeding is practised good care should go to see that the food given is fresh and clean, without any signs of fermentation. The pails and other receptacles should be clean, and all left-overs should be removed before fresh food is filled in them.

AVOIDING WASTE

The goat should not be given any food that it cannot consume readily at any time. Any excess feed will be wasted. Hay should be fed sparingly, as any excessive quantity fed will be wasted as litter. Feeding at regular intervals will not only keep the appetite of the goat more even but will also make it relish the food better.

The feed given to the goat should contain sufficient material needed for its bodily functions, for growing (in the case of young animals), for the growth of the young in pregnant animals and for the production of milk in milch animals and 'condition' in meat animals.

Concentrated feeds should be given to the goats to supplement the grass or leaves they feed on. Goat-keepers are familiar with concentrates like gram and its by-products, wheat bran or husk and gram kernels which are used for feeding goats in milk. Sometimes pods of *babul* or *pala* (*jhar beri*) are used as a substitute for concentrates.

FOR MILCH GOATS

To obtain a maximum milk-

yield from goats, concentrates have to be fed to them. A milch goat requires a $\frac{1}{2}$ lb. ration for its body needs (maintenance) and 5 oz. of concentrates mixture for each pound of milk yielded.

During lactation, the goat as a general rule should get 4 lb. of roughage (fodder) and 1 lb. to $1\frac{1}{4}$ lb. of concentrates per day. Though it is not customary to feed the goat during the dry period, it is advisable that it is given $\frac{1}{2}$ lb. of concentrates along with the roughage every day. The quantity, however, will have to vary with the size of the breed maintained.

PREPARING CONCENTRATES

Locally available materials are best used for preparing the concentrate mixture. It will be cheaper too. The mixture should be balanced by using different feeds such as wheat bran, cake, gram or pulse *chunies*, maize, etc. While it is true that the goat gets tired of a monotonous diet, sudden changes in the diet are never advisable, as they upset the digestive system of the animal. Changes in the diet should be brought about gradually.

When the goat is going up in milk, she should be given feed a little in excess of her needs so as to encourage her to do her best. When there is no more rise in milk production to compensate for the higher level of feeding, it can be assumed that she has reached her maximum capacity and further increases in feed stopped.

The male should get the same feed level as the female, but if it were to be fattened for meat, giving a little more feed will be worth the while. For the buck, the feeding schedule should be the same as for adult-milkers.

FEEDING THE KID

Kids may be natural-reared or hand-reared. Natural-rearing, consisting of the kid being put on the teats of the mother is common in our country, hand-rearing being resorted to only when the mother dies or when weaning is desired.

Hand-rearing or feeding the kid with bottle and teat or from a pail can be done easily. Bottle-feeding, however, is better because this way the kid takes in a little of its saliva with the milk which helps in digestion. Kids also get accustomed to foster mothers. It will only be necessary to guide them to the teats.

Kids usually start nibbling at two weeks, and should be given concentrates when three weeks old. The quantity can be about 1/8 lb. according to season and availability.

SALT LICKS

Providing salt and other licks is as important for goats as for other livestock. Salt-licks should be, therefore, available to goats at all times. Stall-fed animals can also be provided with small quantities of salt mixed with their daily grain feed to the extent of one per cent.

Minerals are required for body-building processes as well as for the production of milk. The most important minerals required are calcium and phosphorus. These minerals can be supplied to the goats by feeding them with a little bonemeal.

HFY-8

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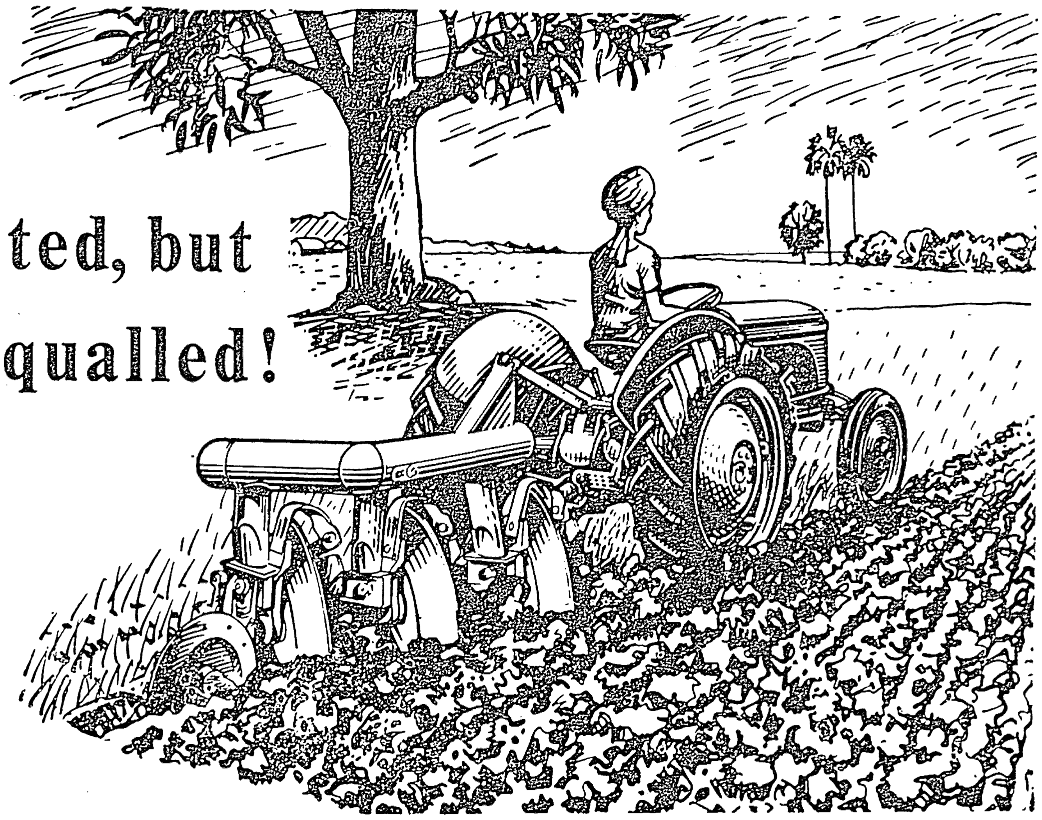

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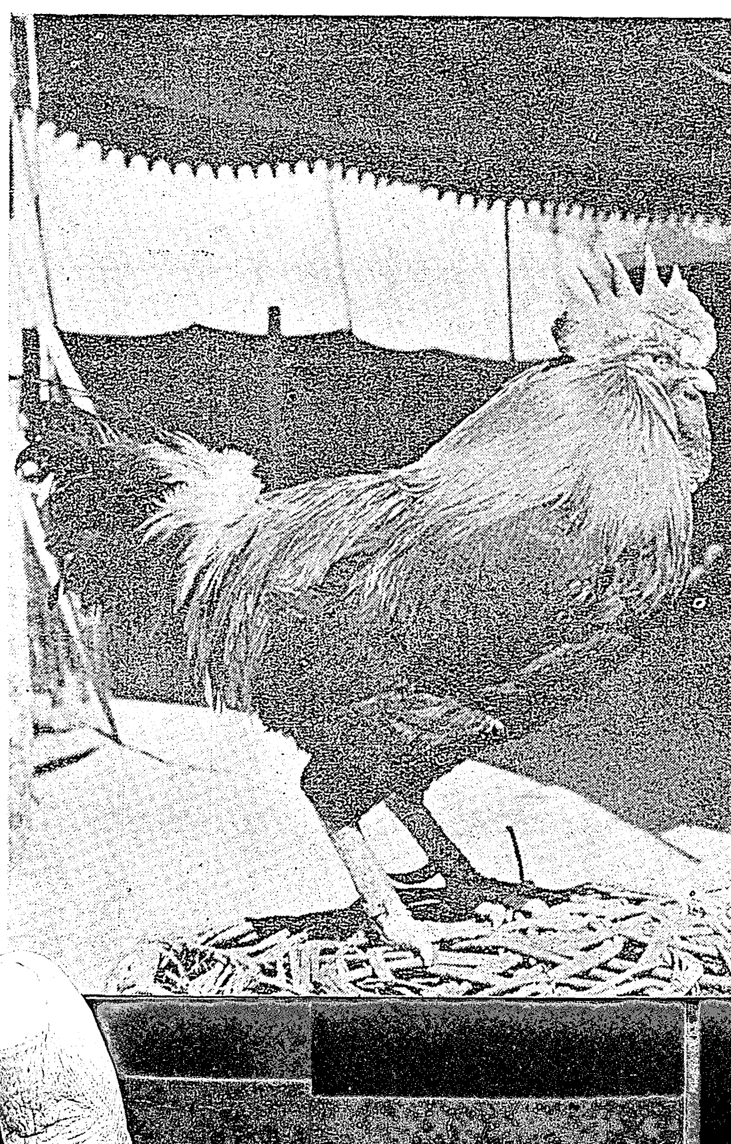
ALL-INDIA

Eight common breeds of poultry comprising more than 400 standard-bred fowls from all over the country and belonging to nearly 40 breeders representing both Government and private farms were exhibited at the All-India Poultry Show held recently at Bahadurgarh on the All-India Cattle Show Grounds.

Besides White Leghorns, the breeds represented were Rhode Island Red, Black Minorca, Light Sussex, New Hampshire, Plymouth Rock, the improved Desis from the Central Veterinary Research Institute, Izatnagar, and fighting Aseles from Hyderabad.

A prize-winning Desi cock from Ajmer



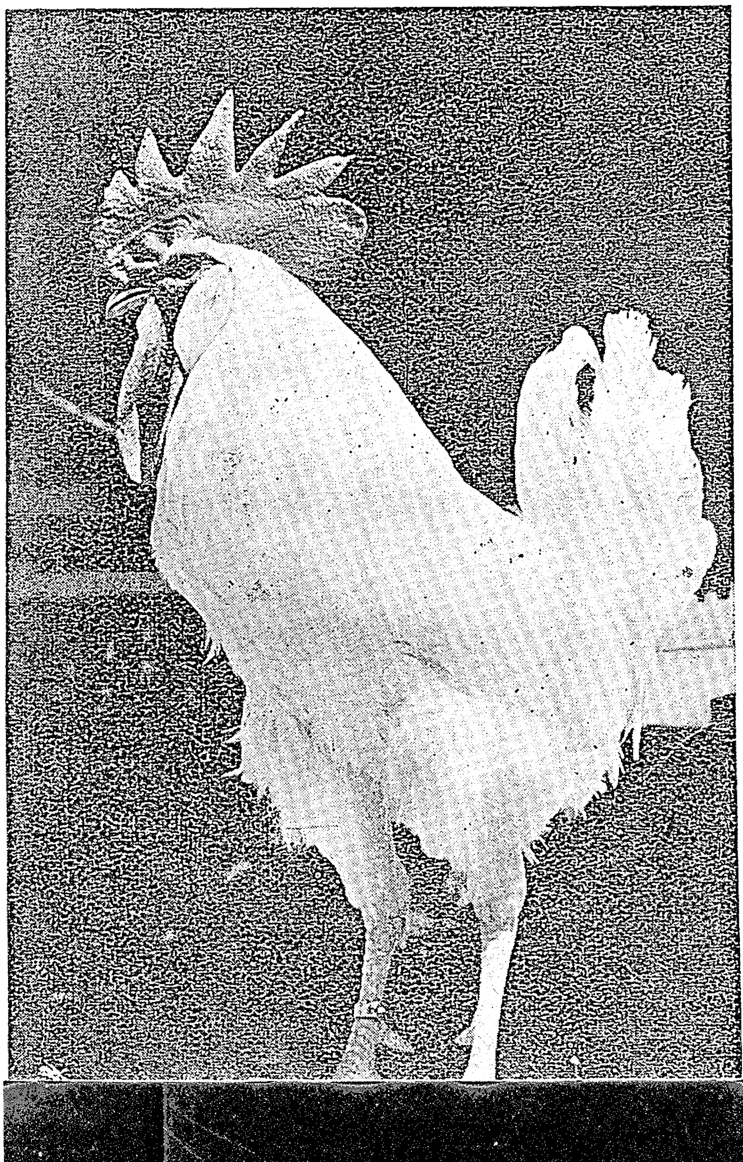
POULTRY SHOW

For over 100 birds attractive cups, certificates and cash prizes were awarded.

A White Leghorn cockerel of the Friends Poultry Farm, Saharanpur, U. P., and a White Leghorn pullet of the American Presybiterian Mission Poultry Farm at Etah were adjudged the best birds at the Show.

The Show afforded an excellent opportunity to breeders and fanciers to discuss the problems of production of high class birds and eggs and also to the layman to learn a lot about poultry-keeping on better lines.

A prize-winning White Leghorn at the Bahadurgarh Show



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The Supreme Champion Murrah buffalo bull jet black in colour, was typical of the breed, and possessed a massive frame and tightly curved horns. The bull was roughly $4\frac{1}{2}$ years of age.

Shri Hardwari Lal, the representative of the Gobhana Panchayat told me that besides gram and cotton seed, the buffalo bull was fed with 5 seers 7 oz. milk and half-seer jaggery.

Highestm ilk-yielder : 'Meena', a Sahiwal cow from the Military Farm, Meerut Cantonment, 10 years old and giving an average daily yield of 39 lb. 11 oz., annexed the Z. R. Kothavalla Cup awarded to the highest milk-yielding animal in the Show. The cow also won the Sir Datar Singh Challenge Cup.

The Sir Hurmasji Kavasji Dinshaw Cup for the highest milk-yielding buffalo cow went to a Murrah from Ferozepur Cantonment.

Best cow : 'Lafili', a Tharparkar cow six years and four months of age, from the Cattle-cum-Dairy Farm, Karnal, and 'Hemavati', nine years of age from Bhagawat Bhakti Ashram, Rewari were the recipients of the prize for the best cow in the Show. 'Hemavati' also won several cups and cash prizes aggregating to Rs. 1,025/-.

Best buffalo : The buffalo cow belonging to Shri Hoshiar Singh, village Nagloi, Delhi State, annexed the Baroda Challenge Cup awarded to the best buffalo cow in the Show, also received the Sir Sobha Singh Cup and cash prizes amounting to Rs 325.

Best Bullocks ; A pair of bullocks belonging to Shri Rachpal of District Rohtak stood first in the pulling contest and won the cash prize of Rs. 200.

Other prize-winners: The Bombay Humanitarian League Gosamvardhana Medals awarded to best cattle reared in *goshalas* or *pinjrapoles* went to a Hissar bull (Goshala Society, Kanpur), 'Rajkumar', a Gir bull (Panchawati Pinjarapole, Nasik) and 'Hemavati', a Hissar cow (Bhagawat Bhakti Ashram Rewari). They also received cash prizes of Rs. 100 each.

SHEEP AND GOATS

The number of sheep and goats in the Show was small but practically all the important breeds were represented. The sheep exhibited included the Bikaneri, Chokla and Gaddi breeds. The goats belonged to the Betal, Barbari, Gaddi and Jamnapari breeds The long, tall and robust Jamnapari buck 'Bhura' belonging to Shri Dagru of Etawah was the centre of attraction in this Section.

The sheep and goats were adjudged according to the different classes laid down on the basis of breeds, age and sex groups The winners in the different classes were awarded cash prizes.

Your Questions

★ MANURING SCHEDULE FOR ONIONS

★ DISEASES OF CHILLIES

★ TREATMENT FOR H. S. IN CATTLE

MANURING OF ONIONS

Q: Can you tell me in detail how the onion crop has to be manured ?

A: Onions normally require very heavy manuring both in the nursery and in the field where the crop is transplanted. Seeds of onion are sown in the nursery in the month of October. The beds are prepared well in advance. A bed of the size of 5 *marlas* or 1/32 of an acre will give sufficient seedlings for transplanting an acre of land. Flat beds are prepared and in the beds a cartload of farmyard manure, equal to about 25 maunds in weight, is applied. This is thoroughly worked in by ploughing or with the spade to a depth of 6" to 8". When the mixing has been done, the plot is irrigated so that the farmyard manure decomposes before the seed is sown.

Just before seeding the bed, mix 1¼ md. of wood ashes together with 15 seers of sulphate of potash. The bed is ready for sowing. After sowing, the beds are to be irrigated.

When seedlings are about six weeks old, another dose of a mixture of 1¼ md. of wood ashes and 15 seers of sulphate of potash is top-dressed in the bed. Usually, with such a manure application, the seedlings are vigorous. In case seedlings show a pale green colour, application of a mixture of 5 lb. each of ammonium sulphate and superphosphate should be top-dressed before irrigation. The seedlings are normally ready in 10 weeks for transplanting.

The seedlings are transplanted during December and January. The seed-bed required for onions should be mellow, deep and contain lot of organic matter. The three alternative methods of supplying the organic matter and the requisite quantity of nutrients may be listed in order of their merit as under:-

(1) When farmyard manure is available in plenty, 25 tons are applied to an acre. Along with the farmyard manure 2½ md. superphosphate and 5 cartloads of wood ashes are also worked in into the soil. If sufficient quantities of wood ashes are not available, then 2½ md. of sulphate of potash may be applied. This has a very good effect on the development of the size of bulbs.

(2) When, however, farmyard manure is not available, a green manure crop such as sanhemp is sown with the start of rains. The seed rate per acre used is one maund At the time of sowing sanhemp, an application of 1¼ md. of superphosphate helps to increase the fertility of the land. The crop is buried after 8 weeks of growth. When the soil does not possess sufficient moisture, one or two irrigations after burying the green manure are given to quickly decomposei t.

(3) In the absence of farmyard manure and when it is not possible to green manure the field because of an already standing crop, fertilizers are applied after transplanting. The fertilizer mixture should consist of 1¼ md. of ammonium sulphate plus 1½ md. of sulphate of potash. This schedule of manuring is no substitute for the former two alternatives because organic matter is definitely required for raising a good bulbous crop of onions. When the land is poor, another top-dressing with ammonium sulphate may be essential when the crop is about 2 months old. This dose may be about 1½ md.

The onion crop is a heavy feeder of plant nutrients and requires heavy manuring both in the nursery and in the field stage. The development of the size depends entirely upon the manuring given to the crop. The factor of spacing of crop, however, should not be overlooked when onions are raised for market. The spacing between row to row should be 9" and plant to plant 3". With such heavy manuring, it is also desirable to keep the beds sufficiently wet by constant irrigation.

ABOUT CHILLIES

Q: Is there a virus-resistant variety of chilli, and if so, which ?

A: Yes, Nos. 46 and 390 are the varieties of chillies which are resistant to thrips—the insect vectors that spread virus diseases.

Q: Does the virus persist on the seed or in the ground ? If on the seed, is there any way of treating the seed ?

A: No. Although the virus are believed not to persist on seed, or in the soil, it is advisable to use the seed from healthy plants. Anyhow, once the infection takes place, it is not possible to treat it.

Q: Is it likely that this disease is aided by any mineral deficiency? If so, what? Ours is a red laterite soil.

A: It is a fact that a poor growth of plants renders them more susceptible to diseases. Chilli thrives on rich, well-manured soil and the mineral dificiency, if any, should be met by the addition of artificial fertilizers.

Q: For the control of thrips what is the chemical, the concentration and the frequency for spraying? I. C I. says Benzadrine Hexachloride. You say nicotine.

A: The control of thrips with nicotine sulphate is described in the article (March 1954 issue of "Indian Farming"). Benzadrine Hexachloride may also prove

useful. Spraying should be undertaken as a regular routine job before the virus diseases spread and the intervals may be regulated in accordance with the insect activity. Moreover, the virus-infected plants should be uprooted, taking care that their foliage does not come in contact with the healthy plants, and even those who pull out these diseased plants should be careful not to touch the healthy plants.

Q. Where may I secure the seed of the improved types, N. P. 46 and 390 ? We run a demonstration farm of 20 acres, and are preparing to raise and distribute seed.

A. The seeds of types N. P. 46 and 390 can be had from the Director of the Indian Agricultural Research Institute, New Delhi, 12.

Q. Is 'small leaf' the same as leaf curl ? The leaves do not curl, but new tiny leaves grow from the stalk and eventually all the plant has small leaves.

A. Yes. The symptoms described in the query are caused by virus diseases.

CATTLE DISEASE

Q. Can you suggest some treatment for *Haemorrhagic septicaemia* in cattle ? Please also let me know the treatment locally done by village people.

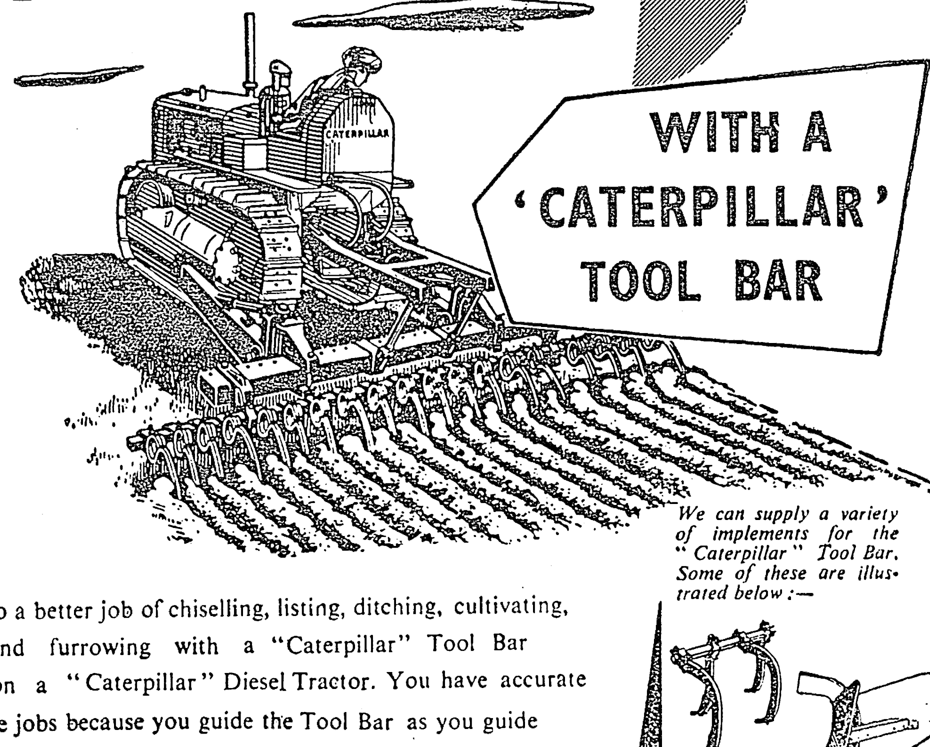
A. *Haemorrhagic septicaemia* usually runs a very accute course and death occurs quickly, so that there is scarcely any opportunity for undertaking treatment. For this and other reasons, it is advisable to have the animals vaccinated against the disease just before the rainy season every year. Suitable vaccines are available and confer a fairly good immunity lasting for a few months.

In some cases, the course of the disease is less acute and permits of curative treatment being attempted. Of the various drugs which have from time to time been claimed to possess curative effects, the sulphonamides (sulphamezathine, sulphadiazine, etc.) and the antibiotics (penicillin, aureomycin, etc.) appear to have given the best results in recent years. Similar claims have also been made in respect of the anti-haemorrhagic septicaemia serum.

There is no satisfactory indigenous method of treament for the disease. Household remedies like peppers, ginger, *zeri*, *ghee*, opium, and wine have only a doubtful value and may even be harmful in some eases.

The important points to remember in the treatment of bacterial infections in general, and *haemorrhagic septicaemia* in particular, are that the treatment must be started as soon as the animal is found sick, the drug selected must be administered in full therapeutic doses, and the treatment must be continued for a couple of days or so even after the animal appears to have clinically recovered from the attack. The usual measures of segregation, nursing, and proper feeding of the affected animals, disinfection of the premises, and vaccination of the herd must, of course, be also adopted.

Control Your Tillage



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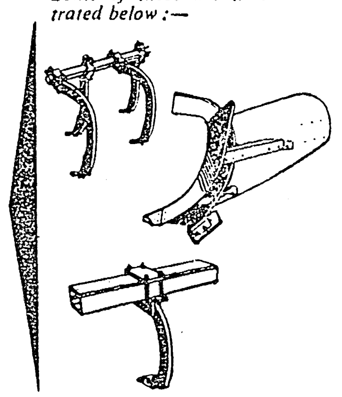

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Printed at Swan Press of Lahore, Sadar Thana Road, Delhi-6

EDITOR'S PAGE

THE NEW CAMPAIGN

Nation-wide interest in systematic and planned action on a broad basis designed to increase crop production was demonstrated in an emphatic manner last month immediately following the announcement of the campaign for increasing yields of the current standing crop of sugarcane. Requests came from a number of states asking that they be also included in the plans for the Campaign.

The new Campaign has been launched to increase sugarcane yields in the states of Uttar Pradesh, Bihar and the Punjab, where in spite of a large acreage under the sugarcane crop yields have not shown any appreciable rise for some years. The campaign has just one slant during the current year and that is the application of fertilizers in sufficient quantities to the standing crop. The response to this has been very encouraging. However, the greater test of the sugarcane industry's willingness to invest in higher yields will come next year when the sugarcane campaign on an all-India basis will be launched.

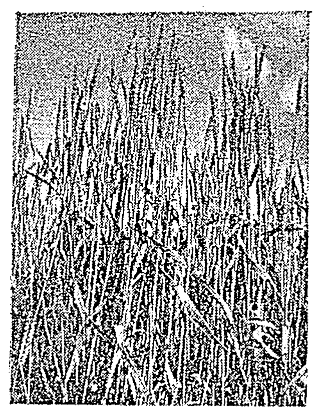
Unlike this year, the next year's campaign will cover all the important practices designed to improve sugarcane yields. Again, stress will be laid on intensified cultivation and not on extension of the present areas under the crop, as the present need in India is to economically increase the output on those acres on which usually the crops are planted.

An heartening sign is the amazing speed with which farmers, who were formerly considered conservative, are changing their practices and adopting the new or improved methods recommended for increasing crop output. There are a number of reasons for the farmers' acceptance of such recommendations. The major one, it looks evident, is the confidence in the farmers' mind that these new practices will definitely increase their returns. Those in charge of the campaigns are making such recommendations to farmers as are proven, taking precautions to see that each step or each item recommended is an accurate reflection of practical tests and research.

With the launching of campaigns such as these, farmers are being shown new techniques for use in crop production so that not only the country will have more food and more raw material for her industries, but also that farm economy may improve. In the case of sugarcane, though considerable strides have been made in the field of research, it is seen that yields are still not what they can be. It has been found that several factors are responsible for keeping the output at low level. Of these, lack of irrigation facilities is a major one, and inadequate supplies of manures and fertilizers is another.

When the irrigation projects on hand, however, are completed, the situation so far as irrigation is concerned will no doubt improve. Yet, in the meantime, farmers can and should take recourse to application of fertilizers to the half-starved soils and thereby reap the benefits of increased yields. The sugarcane crop, a heavy feeder, responds very well to nitrogenous fertilizers and hence the present Campaign is to draw the attention of the farmer to the necessity of this important aspect of cane cultivation and also to make the fertilizer available to him in sufficient quantities and at a convenient mode of payment. In the states concerned the plan is being worked according to schedule and there can be no doubt that with the farmers so responsive as they have been, the Campaign is bound to yield encouraging results.

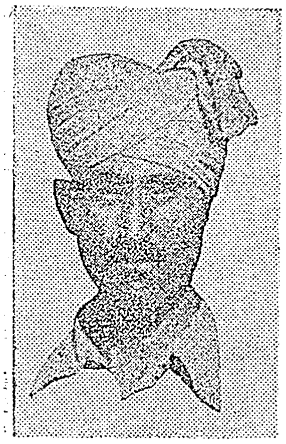
THIS MONTH'S COVER



How the wheat crop responds well to nitrogenous fertilizers was shown recently at the Agricultural Institute at Allahabad. The excellent crop seen in the picture got 40 lb. of extra nitrogen, for which it gave 37.5 maunds of grain. The manure, costing as much as 1.75 maunds of grain, gave an increase of 15.5 maunds in yields.

THE MAN FROM GOBHANA

FARMERS I HAVE MET



THE other day I met Shri Hardwari Lal, a farmer of village Gobhana in Rohtak district of the Punjab. He had a very interesting tale to tell about the Murrah buffalo-bull that was declared Best Animal at the All-India Cattle Show recently held at Bahadurgarh.

The interesting part of the story is that Shri Hardwari gave away a buffalo as a present to his daughter at the time of her wedding. Some time later, when he visited his daughter, he was very much impressed by the sturdy appearance of the bull-calf born to it. He wanted to take this bull-calf to his village and rear it into a first-rate animal for use in improving the village stock. But the high cost involved in maintaining the bull-calf had to be considered.

On his return to the village, he placed his proposal before the village panchayat who readily gave their approval to this project as the village was badly in need of a good bull. The panchayat agreed to bear all the expenditure in this connection and a retired army man offered to house the bull in his own *haveli* as well as look after it.

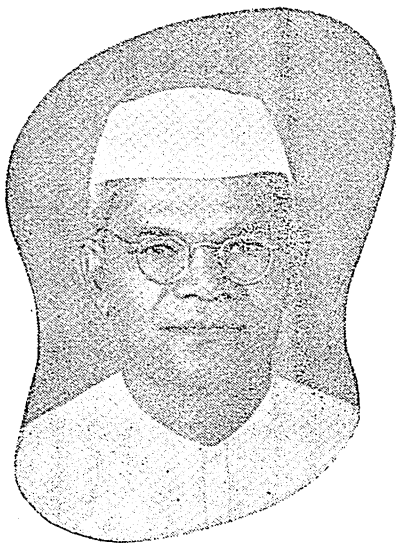
The animal was fed on 5 seers of gram, 5 seers of milk, 2 seers of cotton-seed (in winter) and ¼ seer of *gur* (in winter). Expenditure on all items except milk was met from the common funds at the disposal of the panchayat, and the daily needs of milk were collected from the villagers.

On an average, the bull is giving 500 to 600 services a year. There is no profit motive, as the bull is not hired to outsiders; it is only meant for use in the village.

How leadership can prompt community action for the betterment of the villages has been shown by Hardwari, the farmer of Gobhana.

—H. K. S.

MEN OF THE MONTH



K. G. PATEL

P. V. MEHTA

B. J. PATEL

3 DAIRYMEN

WHO BANKED ON HARD WORK AND PATIENCE

By

HARKIRAT SINGH

"PROGRESSIVE, painstaking and prosperous", that is how I would describe Messrs. Keshavbhai G. Patel, Prabhubhai V. Mehta and Bhailalbhai J. Patel, owners of "Adarsh Dugdhalaya", a private dairy farm near Marve Road at Malad, a Bombay suburb.

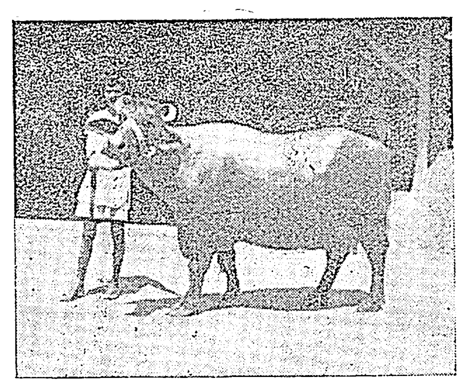
I visited this much-talked of dairy farm in April last. As I went round the Dairy, accompanied by my hosts, the vastness of the organization and the manner in which it was being handled impressed me, especially when I was told that all this had been done without much technical guidance from outside.

The very first question that I put to Mr. Mehta, who did most of the talking to me thereafter, was as to how they had rambled into this hazardous business and made a success of it.

"The plan for starting a dairy farm", came the reply, "was worked out by us in jail in the days of the Civil Disobedience Movement of 1932". My curiosity increased.

"We were faced with the problem of doing something when we got out of the prison", Mr. Mehta went on. "The milk trade was selected because we

This is Nilima, the Murrah buffalo bred on the Farm. Her highest yield was 8,068 lb. in 421 days. She is averaging 19.2 lb. per day against the average of 14 lb. for the herd



The morning milk moves out: vans such as this transport pasteurised milk to the distribution centres

had had some experience in this line as we had run a dairy farm as active workers of Patidar and Bardoli Ashrams."

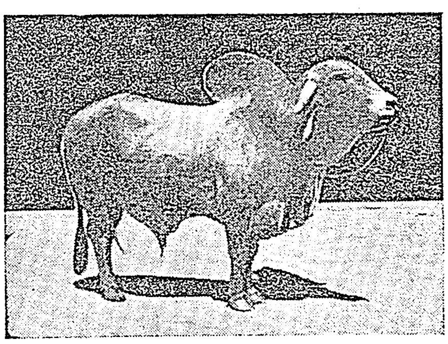
"According to the plan, on our release from jail in 1933, we borrowed a couple of thousand rupees from our friends and sympathisers and set up a small dairy farm, comprising only two buffaloes, and located it in a hired stable at Andheri." As I stretched by imagination a little in an effort to visualise the dairy in miniature of 20 years ago—producing 40 lb. of milk daily for its 20 customers — and compared it with the huge set up then before me—producing 7,200 lb. of milk a day and catering to the needs of over 2,000 patrons with a livestock population of 1,200 and a staff-strength of 500—I could easily realise how much hard work and patience had gone into the making of what "Adarsh" is today.

"The start was humble, no doubt", added Mr. Mehta, "but the ideal that we set before ourselves was lofty—that of supplying good and clean milk to the consumers." And a year's careful experimentation showed them that an honest living could be made out of this business with which malpractices are traditionally associated.

THE DAIRY COMES OF AGE

Encouraged by this, Mr. Mehta further told me, the present site was purchased and developed as a proper dairy ground at a considerable cost. Gradually, as the Dairy grew, necessary stables to house the animals and residential quarters for the employees were put up, and a road linking the Dairy with Marve Road was constructed. By 1940, the Dairy was well-established with 280 animals.

Hemraj, the Gir breeding bull maintained on the Farm. Breeding of stock receives careful attention from the owners



One particular thing that struck me while going round the Dairy was the perfect cleanliness of the stables. "We wash them twice daily and also use phenyle and D. D. T. to do away with the germs that might do harm to our animals", explained Mr. Mehta.

The Dairy maintains mostly the Murrah breed of buffaloes and Gir cows. I came across some really fine specimens of these breeds. And it is all the more creditable that they were all raised on the Farm alone.

"Do you give your animals any special feeds, Mr. Mehta?" was my next query, "they are so healthy."

"Not only healthy, but they are good milkers also. We give them nutritious feeds, and in adequate quantities. In addition to cotton-seed, pulses like *arhar*, *guar* and gram, oilcakes like coconut, groundnut and linseed and wheat bran, they get sufficient quantities of hay, carrots, turnips, mangolds, lucerne, *jowar* and maize, according to the availability." I was told that the average daily milk yield per animal was 14 lb.

"Do you rear your own animals?" was my next question.

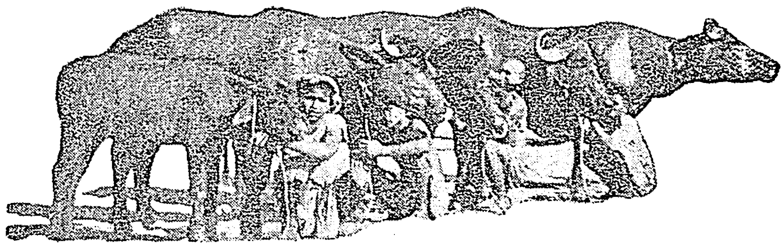
"Of course. The majority of animals that you have seen here are bred on the Farm. It is only rarely that we purchase animals from outside."

CARE IN SELECTION

"We, however, selected the best animals for rearing. Only male calves whose mothers yield more than 7,000 lb. of milk in one lactation are reared for breeding purposes. Similarly, only heifers whose mothers show a record of 5,000 lb. of milk in a lactation period are retained."

Mr. Mehta then told me that they maintained records of the daily milk-yield of individual animals of the herd.

Three Farm-bred generations. Their performance is watched, and undesirables are always weeded out



He also told me that as soon as any slackness in the milk-yield of any animal was noticed, it was immediately disposed of. The daughter's milk-yield was always compared with that of the mother to see whether there was any improvement in milk-yield in the younger generation.

Milking of the animals had been completed by the time I reached the Dairy as "this is done early in the morning," my host told me. He conducted me to the cooling chamber where all the milk had been collected for pasteurisation. "After pasteurising, the milk is filled in sterilised cans which are then sealed and sent to the various distribution depots set up in Bombay City and the suburbs," I was told.

Mr. Mehta was a little amused when I asked him as to how they were ensuring quality milk at the delivery end. The reply received was interesting.

A home-delivery system for supplying milk in sealed bottles was adopted in 1941, but after one or two years, bottles had to be discontinued due to their non-availability. It had to be replaced by some equally fool-proof method by which malpractices could not be practised by delivery-men. The method introduced, and which is still in force, is that each customer is supplied with a card on which he records daily his remarks about the quality of milk supplied to him. At the end of a month, these entries are gone through, and whereas bad remarks entail a cut in the wages of the delivery-men concerned, and even dismissal, a satisfactory report brings them an extra payment of Rs. 20.

SALVAGING DRY STOCK

I also came to know that keeping of dry animals is a special feature that distinguishes this Dairy from others. Mr. Mehta was specially emphatic in bringing this to my notice, as he said, producers of milk were generally not in favour of salvaging dry animals and bringing them back in milk. Such animals were usually sold to the butcher. "In this Dairy, dry animals are maintained with good care," he stressed "and at present, the 'Dugdhalaya' is maintaining about 250 dry animals. From our experience here, I can definitely say that dairy-farmers stand to benefit by salvaging their dry animals rather than disposing them of for a trifle".

The Dairy has 500 acres of land at Palghar, where the dry animals are kept and a sort of mixed farming is done with the stress on dairying. Of the 500 acres, 50 are exclusively devoted to the growing of fodder grasses. On another 400 acres good quality grasses are grown for hay purposes. These acres are being gradually improved by means of light cultivation and droppings of cattle which are allowed to graze on it after the grass has been cut. The Dairy is not only self-sufficient in regard to its fodder needs but also does a flourishing trade in this commodity. Availability of continuous supplies of fodder has

(*Continued on page 32*)

FARMING ELSEWHERE

AMMONIA AS FERTILIZER

Agricultural ammonia, cheapest source of nitrogen for application to crops, is becoming increasingly popular as a fertilizer on United States farms.

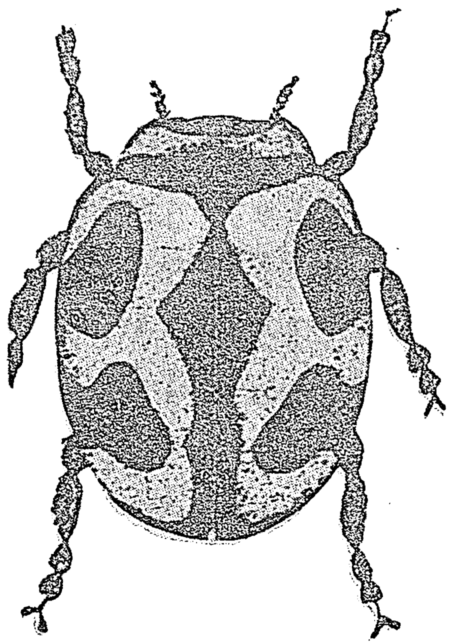
The nitrogen-rich ammonia is best suited for irrigated crops, because it can easily be used in irrigation water. However, it is also being piped with special equipment into the soil. Whatever the method of use, farmers consider it easier and more economical to apply ammonia than nitrates in solid form.

In California, agricultural ammonia was introduced on a limited scale in 1940. Today, the fertilizer is being used in large quantities in 40 out of the 48 states. At present, it helps the production of more than 200 crops including cotton, maize and citrus. This year's expected production is 3,00,000 tons.

The farmer simply allows the ammonia to flow into the ditches of his water system if he has an irrigated farm. Otherwise, he feeds into his land with an applicator which may be an instrument with 1, 2 or 4 wheels.

In most soils, ammonia has definite advantages over solid fertilizers. First, it is easier to transport and transfer from tank to tank. Second, ammonia goes quickly to work in the soil, while the solid fertilizer must be injected through rain or applied water. Although the liquid's actual cost per ton is higher than that of solid plant food, it is the cheapest source of nitrogen because the nitrogen content is 82 per cent by weight compared with 21 per cent in ammonium sulphate, 33 per cent in ammonium nitrate and 45 per cent in Urea.

Most farmers are of opinion that application of ammonia is labour-saving too.



Rodolia cardinalis

COMPLETE CONTROL WITH

RODOLIA

STORY OF A SUCCESSFUL CAMPAIGN AGAINST A SERIOUS PEST IN MADRAS

ONE of the most successful compaigns against insect pests in India ended recently. The campaign was against the Fluted Scale or the Cottony cushion scale (*Icerya purchasi* Mask).

The Fluted Scale is a serious pest of fruit trees in foreign countries and evidently was introduced into India. It was first noted on wattles (various species of Acacia) in the Nilgiris of Madras State in 1928 and further investigation revealed that it thrived on citrus varieties in addition to a wide variety of vegetation on the hills.

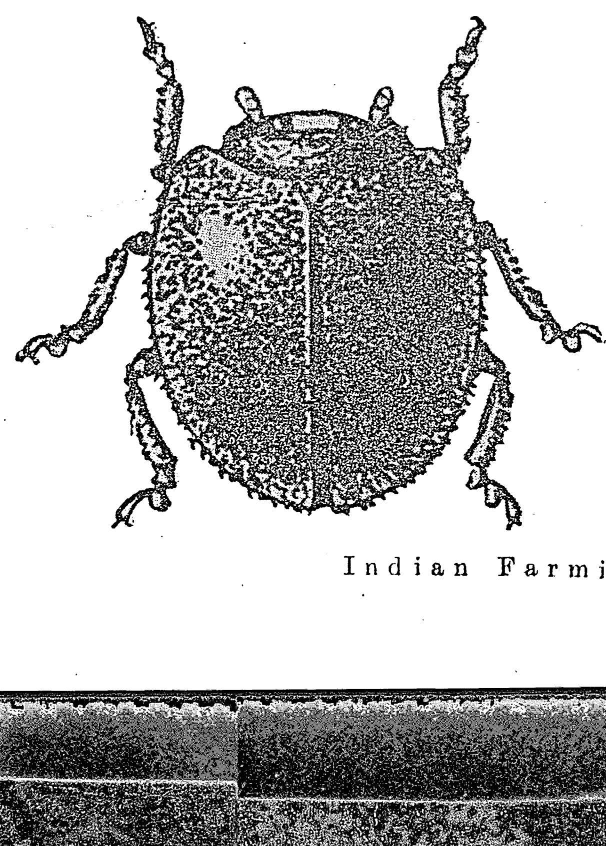
The scale is easily distinguished from its allies by its characteristic appearance and size. It is thick and somewhat elongated (quarter inch to half inch in length) with conspicuous longitudinal furrows on the surface. The insect is highly prolific and lives in colonies or masses on the different parts of the affected plants or trees. While the mealy wax on the grown-up scale is whitish, the eggs and young ones are brick-red or pinkish in colour.

After a short active period, the young ones settle themselves on suitable situations and grow in size actively sucking the sap of the host. A large population of scales living and multiplying on a plant is capable of inflicting severe injury to the host.

The length of a generation is about 2½ to 3 months in the hot season and about 2 months longer in the colder parts of the year. The insect gets spread in various localities mainly through human agency by the transport of infested material in trade and commerce.

In the earlier years when the pest made its appearance in the Nilgiris, the Madras Department of Agriculture took up emergency steps to minimise the pest attack and check its spread through mechanical methods of cutting and burning the infested material. Later on, investigations showed that the lady bird beetle (*Rodolia roscipennis* Muls), a caterpillar (*Stathmopoda melanochra* Meyr) and a fungus (*Cladospirium* sp.) were found to be the natural enemies of this pest. These were, however, found inefficient for the control of this new pest.

Rodolia roscipennis



In 1929 and 1930 a predatory beetle (*Rodolia cardinalis* Muls) was imported from California and Egypt and studied in detail to see the possibility of using it in the control of the pest. The experiment was attended with success and the predatory beetle was reared in different places and liberated in all the localities known to be infested.

The beetle Rodolia is small in size and dull reddish in colour. It is long-lived and lays large number of eggs. It breeds in captivity fairly easily if properly looked after and fed on scales.

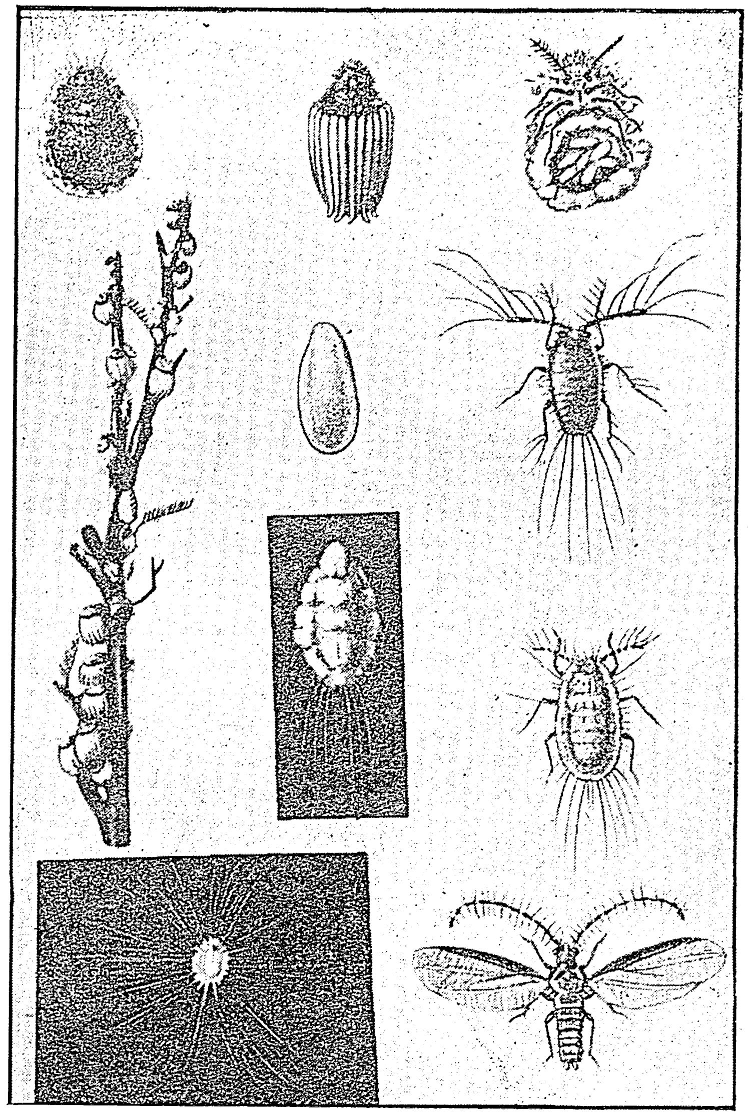
The work of breeding and releasing this beetle was so impressive and recoveries of beetles in the field so satisfactory that the biological station claimed unqualified success in having colonised the new-comer in all the infested areas. Field conditions showed a phenomenal decline of the pest and the survival to a remarkable degree of the new predator. Control operations were wound up in 1931.

The initial intensive work of rearing and liberation of the predatory beetle during 1929-31 kept down the Fluted Scale for over a decade. The predator which had established itself appeared at times of pest outbreak and the Nilgiris region became the reservoir from which specimens of this beetle could be collected for breeding and releasing in other regions.

SECOND INFESTATION

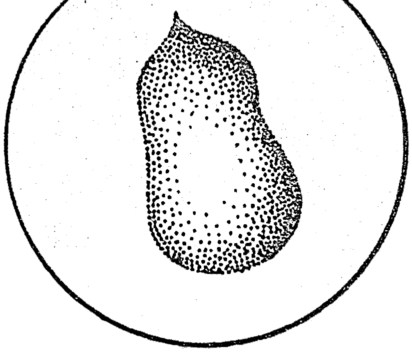
The year 1941 saw a secod wave of infestation by the Fluted Scale in the Nilgiris and Kodaikanal and the special laboratories in both these areas took up the work of rearing the predator in thousands. The Indian Council of Agricultural Research, realising the importance of the work, strengthened the Rodolia breeding Scheme and sanctioned research work for a period of two years from 1945 to 1947 in the first instance. Subsequently, this became a part of the All-India Co-ordinated Scheme for the control of the Fluted Scale and was extended year after year till 1952 when it was finally closed down.

During this period, thousands of Rodolia beetles were released in the Fluted Scale-infested areas of the Nilgiris and Kodaikanal on orange, wattle and gorse. Apart from the mass release of beetles, hundreds of them were sent to the Breeding Station at Bangalore.



Various stages in the life of the Fluted Scale

The Scheme, therefore, had complete success in colonising the predatory beetle and effectively checking the multiplication of the pest in different areas. Quarantine measures scrupulously applied to prevent transport of infested material further helped in quick control. The effective check on the pest protected valuable crops such as fruit trees, tea and coffee from getting infected. The Scheme also helped build up an excellent resource for the distribution of potential predators to other needy centres in India at times of emergency.



JAMAN SEED AS CATTLE FEED

One protein-rich food usually wasted is the seed of *Jaman*. Properly dried and fed, it can be a good cattle feed

INVESTIGATIONS at the Indian Veterinary Research Institute at Izatnagar have shown that the *jaman* seed can well be utilized as a cattle feed. The Animal Nutrition Division of the Institute has been searching for new animal feeds from hitherto untapped sources since 1940. A number of substances, which are usually wasted, have so far been found to be highly suitable as cattle feeds.

Though we have a high density of cattle population, their productivity is extremely low. Experience, however, shows that Indian cattle do possess high potentialities, and when proper care is taken to supply them with a balanced ration, their productivity is immensely increased.

The availability of digestible proteins, the flesh-forming material, is far short of the actual quantity required for feeding the animals, and increasing their productivity. Hence the Institute's search for easily available but so far untapped sources of protein-rich foods.

Jaman, (*Eugenia jambolana*), commonly found throughout India, is a tree usually of a considerable size with a thick and a rather crooked trunk. The fruit which is sour, acrid and sweet is eaten and the seed usually thrown away.

RICH IN PROTEIN

At the Institute, the seeds were analysed to find out their protein, carbohydrate and phosphorus contents. It was found that the seeds were fairly rich in protein. In protein-value and the concentration of carbohydrates (the energy-giving material), the seed is comparable with grains like barley, maize, oats, rice, wheat, etc. The content of calcium—the bone-forming element—in the seed is higher than in these and many other grains. It is, however, appreciably poor in phosphorus.

After collecting the seeds from underneath the trees or waste heaps, they should be washed first to remove the adhering sand and dried for about ten days in the sun. Drying in the sun enhances keeping quality and frees the seeds of the peculiar odour they possess.

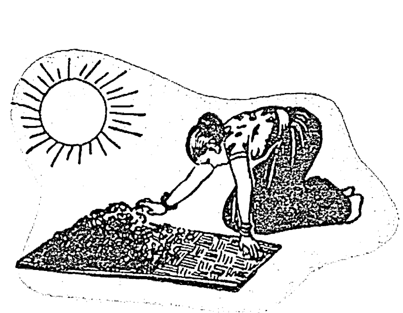
Animals are not ordinarily attracted towards these seeds, presumably on account of the peculiar odour they have. When, however, the seeds are washed free of sand and dried in the sun for a few days and then offered to them in combination with grains and/or oilcakes, they show no disinclination to eat them.

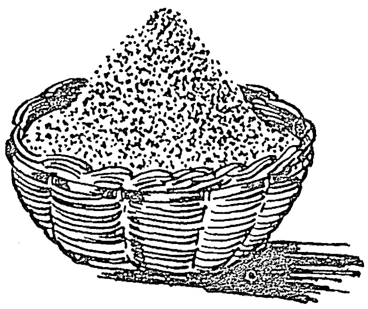
Feeding the seed to animals may be done in combination with grains or oilcakes in a small proportion. The animals soon acquire a taste for it, and the proportion may then be gradually raised to 15 to 20 per cent of the concentrate mixture. In this proportion in the concentrate mixture, *jaman* seed has been fed to cattle over prolonged periods with satisfactory results. The nutritive value of *jaman* seed compares favourably with concentrates of proved value.

The keeping quality, like that of other seeds, seems to be satisfactory, as *jaman* seeds can be kept over fairly long periods without deterioration.

FIELD EXPERIMENT

In order to convince the rural population regarding the usefulness of *jaman* seed as a cattle feed, extension experiments were carried out in Delapir, a village about a mile from the Institution. A concentrate mixture containing grains and or oilcakes together with washed and dried seed was fed to growing calves work bullocks and also to milch animals, and the proportion of *jaman* seed in concentrate mixture was gradually raised to 20 per cent. The animals showed no disinclination to this





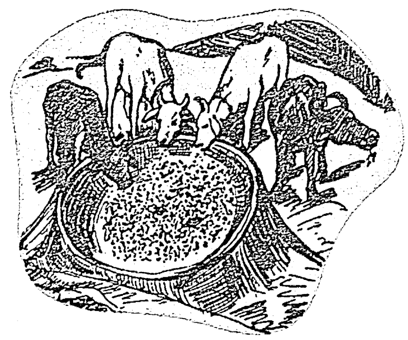
feed, and maintained good health. The results of these feeding trials have convinced the village stock-owners of the usefulness of *jaman* seed as a concentrate and all available *jaman* seeds are being utilized by them now for this purpose.

Two people working for eight hours a day can collect in season about thirty maunds of seeds yielding about seven maunds of dry material. Adding transport charges to that involved in the collection, washing and drying of seeds, the cost would work out to a rupee a maund. Since people can collect the seeds during their leisure hours, the cost involved will still be less.

Though an accurate assessment of the quantity of *jaman* seeds annually available in the country cannot be easily had, roughly it can be taken that one tree yields about two to four maunds of seeds.

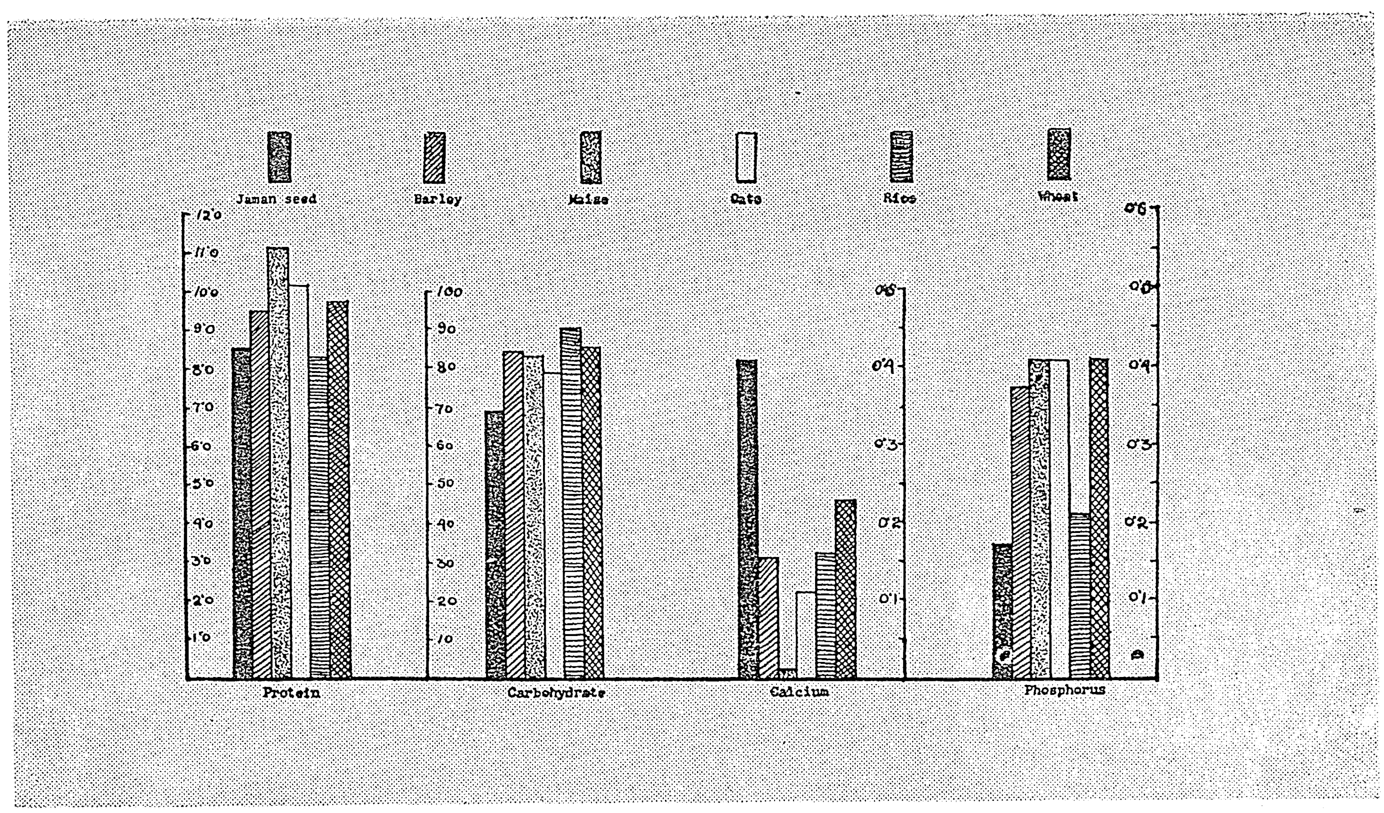
These seeds, when properly collected and stored, would make available from a hitherto unutilized source millions of maunds of protein-rich food worth several crores of rupees annually for our livestock.

Farmers should make all



efforts to utilize this hitherto untapped source of excellent cattle feed by collecting every seed in season and thereby improve the health, growth and milk-yield of their animals.

HOW "JAMAN" SEED COMPARES WITH THE COMMON GRAINS



WHY MANDARIN ORCHARDS DETERIORATE

STUDY SHOWS LACK OF SOIL MOISTURE AND INADEQUATE MANURING AS MAIN CAUSES

IN resent years,a deterioration of Mandarin orange trees has been evident in several orchards in Wynaad (Malabar) and Coorg. The affected tree produces a heavy crop of undersized fruits which is followed by yellowing of the foliage, defoliation and dieback of the twigs. In the course of a couple of years the entire tree succumbs. The roots of the affected trees exhibit varying degrees of rotting.

Mandarin orange (*Citrus riticulata* Blanco) is cultivated over a large area in these tracts. The orchards are situated on slopes of hillocks or in valleys at elevations ranging from 1,000 to 3,000 feet above sea level. Only seedlings are planted and these grow under rain-fed conditions. The rainfall varies from 90 to 150 inches, but is restricted to the months of June to November except for some scattered showers during the rest of the year. A rather prolonged dry period prevails from December to May and usually there are no facilities for irrigation.

This three-year old tree was manured and the soil covered by mulch

In order to investigate the cause of this deterioration, the Madras Government launched a scheme with the aid of the Indian Council of Agricultural Research in 1949. Under this scheme a survey of over 100 orchards in different localities of Wynaad was made.

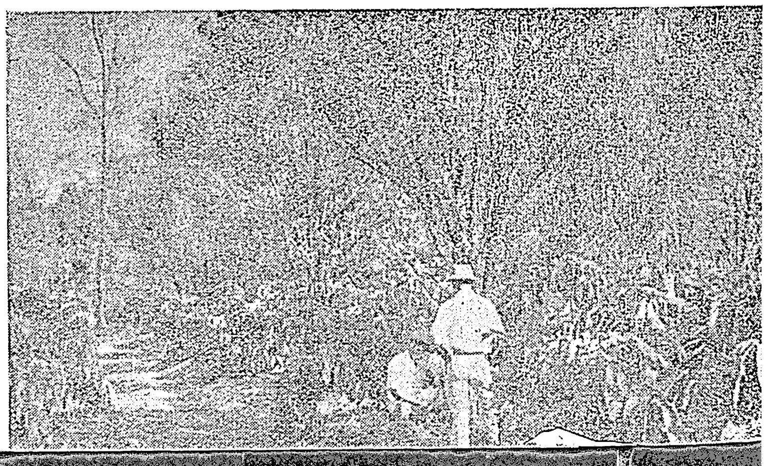
It was found that deterioration of trees was absent in young orchards. There were more casualties in trees growing over exposed situations liable to soil erosion, and where the soil was shallow or waterlogged. A higher incidence was noticed in portions of orchards facing south and west. In the orchards where coffee was grown under shade along with Mandarin, such deterioration was very low.

FACTORS RESPONSIBLE

Investigations, however, revealed that this deterioration was not due to any one specific factor, but many, the most important being lack of soil moisture and inadequate nutrition.

Soil moisture plays a significant role in initiating deterioration. On account of drought conditions prevailing over a continuous period of 4 to 8 months,

Orange and coffee under shade manured and mulched regularly



the trees are adversely affected by lack of sufficient moisture in the soil. The increased incidence on exposed situations and on the tops of the hills indicates the importance of this factor. In Wynaad, the soil around the trunk of orange trees is given one or two diggings every year. This is a harmful practice. Considerable improvement in the appearance and growth of the trees can be effected by providing the soil round the trees with mulch covers of dry leaves during the dry season.

Lack of proper nutrition is a major factor contributing to deterioration. The foliage of the affected trees exhibits varying degrees of chlorosis. Analysis of leaves from healthy and affected trees from the Wynaad tract showed nutritional deficiencies in the latter.

In mountainous regions with heavy rainfall, leaching of nutrients from the soil is bound to occur. The orange trees absorb large quantities of nutrients from the soil each year for the production of new foliage and fruits. Unless these losses are made up by adequate manuring, the soil becomes depleted in course of time and trees lose condition. Deterioration is invariably noticed when the plants are in bearing.

The low incidence of deterioration in well-managed orchards and considerable improvement of the trees which had received systematic application of manures every year show the importance of manuring in the proper maintenance of these orchards.

Decided improvement in the condition of trees and fruit production can be effected by applying the following doses of manures per tree :

75 lb. farmyard manure, nitrogenous fertilizers (10 lb. of groundnut cake), 1 lb. superphosphate, 1½ lb. potash and 20 lb. wood ash. Lime has also been found to be useful when applied at the rate of 20 lb. per tree every alternate year.

These manures are best applied in two doses, in June and November.

Orange roots are very sensitive to wounding and wounded roots are readily infected by wound parasites present in the soil. Infection of orange roots by fungi like *Diplodia* is further aggravated by lack of adequate supplies of nitrogen, and lack or excess of moisture.

This three-year old tree received no manure, but the soil was mulched

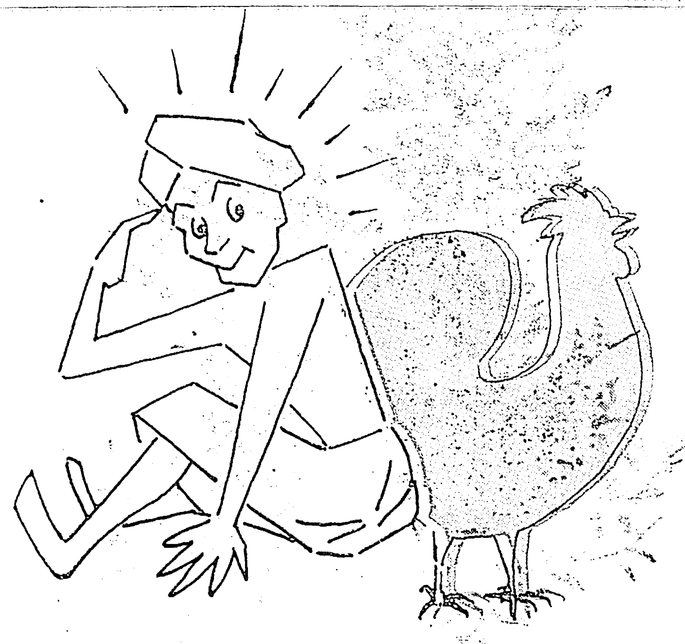
Since such aggravating circumstances are prevalent in the orchards of Wynaad, these may also be contributory factors to the incidence of root rot and consequent deterioration.

Besides these factors, high incidence of stem borers, successive infections by *Phytophthora palmivora*

(*Continued on page 15*)

Orange and coffee—no shade—no manure—no mulch; exposed soil and hence plants are dying

An orchard in an exposed situation. Note the trees are poorer in the upper portion



STARTING A POULTRY FARM?

By
S. G. IYER
Indian Veterinary Research Institute, Izatnagar

A few things to think of before embarking on poultry-keeping

MORE and more people are getting interested in poultry-keeping, and want to start on this profit-getting vocation either as a side-line or as a main bread-earning business.

How do I start on a poultry-farm, is a question that most ask. Thought to a few things before one embarks on poultry-keeping saves a lot of heart-burning later, if things don't go as they should.

The first thing that should receive consideration from the future poultry farmer is the market. He should be assured that there are reasonable prospects of disposing of poultry produce at rates that cover up expenses and leave a good profit margin behind.

The market may be for table eggs and table poultry, or for hatching eggs and breeding stock.

Large markets for poultry-products are to be found mostly in large cities and towns, where a good number of well-to-do people reside. If you are living within a marketing distance of these places, you can build up your own private poultry products trade. Near the bigger centres, another profit-bringing side-line would be to raise fattened chickens weighing from 1 lb. to $1\frac{1}{2}$ lb. and sold at eight weeks. Turkeys too would provide another side-line here.

ASSURED MARKET

If you prefer selling hatching eggs and breeding stock, it is always better you start with in a district where there is already a demand for the same. In certain cases, it may even be paying to start in a district which is yet to be developed, as others will soon try to copy you, and will naturally purchase the foundation stock from you.

Much of the success in the marketing of t e products, however, depends on the contacts you make, and the reputation you establish in supplying only the best to the customers or consumers.

Coming to other details, attention has to be paid to the type of soil on which the poultry farm has to be located. Extreme types of soils such as too dry and sandy or wet and stiff are not desirable for keeping poultry on.

Light soils, though they allow excess water to drain away easily, and are usually ideal for poultry, suffer from a serious drawback. They do not produce good grass, and birds do not thrive on them as one expects to. Very heavy soils too should be avoided as birds do not thrive well on such soils and stagnant water gives rise to diseases such as coccidiosis and worm infection.

I would prefer a medium soil with a fairly good drainage as such a soil will be healthy and the herbage too will be good.

To have a land for a poultry farm nearabout a city or an industrial area would be good no doubt, but remember, such a land would be very costly.

PROXIMITY TO ROADS

Proximity to good roads is desirable. A farm near a busy road and a good signboard help draw the attention of the public and build your retail trade bigger.

Proximity to jungles or waste lands has been responsible for losses of flocks due to wild animals, and hence this is not desirable.

Birds detest strong winds, and hence a sheltered locality should be preferred to barren and open locality. Large trees on the site, however, are not desirable, as they harbour birds like crows which may bring in poultry diseases.

An abundant supply of cheap labour is a strong point to be considered. Cheaply available labour brings poultry-keeping costs down. Efficiency, however, should not be sacrificed for the sake of cheap labour.

Food is the major item of expenditure, and it will pay to fix the farm in a locality where poultry foods are available at reasonably cheap rates. Protein foods are relatively more costly, and hence it would be good to select a spot where there is abundance of cheap proteins of good quality.

Freedom from diseases is a point deserving full attention. Certain districts seem to have a better poultry-health record than others. The farm should be well away from a poultry market and should not adjoin or be likely to adjoin another farm from which disease-infection can spread.

An abundant supply of good water is essential for the birds. It is better that the water is from a good well or a spring on the farm itself. Stagnant water or slow-running water coming *via* other farms should be looked upon with suspicion.

ONE OR TWO BREEDS

The next question to consider is what breed ? It is always better to start with one or two breeds than too many. Once you have established a name for these, then you can add more, may be, for odd sales.

To begin with, select the established breeds for which there is already a demand. Again, the choice of the breed will depend upon whether you intend keeping poultry for eggs, table birds or for stock purposes.

For commercial egg-production, crosses of White Leghorns and Rhode Island Reds would be highly desirable, as these are hardy and excellent layers, and fairly good table birds, are quick-growing and have good carcases. However, if there is good demand for hatching eggs and breeding stock, it may be paying to keep pure breeds.

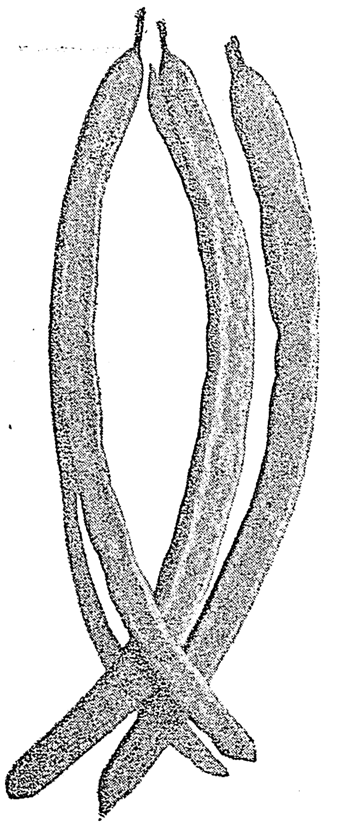
In our country, there is a good demand for White Leghorns and Rhode Island Reds, though there is a limited demand for Black Minorcas, Australops and Light Sussex, and sometimes for other more fancy breeds. But you, a beginner, better stick to the utility breeds to start with and gradually build up a small stock of other breeds when you gain more experience and have established yourself.

(*Continued from page 13*)

(causing leaf fall and fruit rot , *Oidium tingitaninum* (causing powdery mildew) and *Pellicularia salmonicolor* (causing pink disease) have been observed. Unless these are kept in check by the adoption of systematic plant protection methods, the health of the trees is bound to suffer culminating in death.

In brief, provision of mulch-covers over the soil, judicious planting of shade trees, adequate application of manures and timely protection of the plants against pests and diseases will result in the improvement of orchards.

MESQUITE FOR THE ARID GROUND



Ripe Mesquite pods

By
HARBHAJAN SINGH,
Indian Agricultural Research Institute, New Delhi

RECENTLY, press reports indicated that about 250 maunds of seed of the Mesquite tree (*vilayati khejra* or *vilayati babul* or *vilayati kikar* and botanically, *Prosopis juliflora* D. C.), *babul* and a few other trees were sown from the air in a belt 25 miles long and two miles broad in the Rajasthan desert.

This experiment was conducted with the objective of creating a 400-mile green belt in the Rajasthan desert, ultimately to help check the shifting of sand and thereby check any further extension of the desert.

The preference given to Mesquite over other trees which can also be grown in dry areas is of interest.

The Mesquite, an evergreen spiny tree, is a native of the arid regions of Mexico and Central America. The tree was introduced into India in 1877, when the first consignment of seeds was sent from Kew, England. It was successfully grown in Jodhpur (Rajasthan) as early as in 1915. Now it is found over a greater part of the plains in this country. It is also very common on the ridge at Delhi. Four forms of this tree are reported to occur in India. These are known as the Australian form, Mexican form, Argentine form and the Peruvian form.

MULTI-PURPOSE PLANT

The Mesquite is a multi-purpose plant. It is drought-resistant and can utilize arid, barren ground where very few other plants can grow. This ability of the Mesquite to grow satisfactorily in dry areas is attributed to its stout and tapering tap root which goes as deep as 70 feet into the soil. The tree attains a height of 30 to 40 feet and a spread of 20 to 25 feet. It is quick-growing, and usually flowers twice in the year, during March and September.

The long sugary pods, particularly of the Australian form, are a cheap source of digestible protein, and are relished by cattle. A 100 lb. of pods are reported to contain 8 lb. of digestible protein, 50 lb. of carbohydrates and 21 lb. of fat. The flowers, borne on long spikes, secrete honey, and as such are visited by honey bees. The Mesquite gum is almost identical with gum arabic. This tree is also a source of tannin. When planted closely, it forms a good perennial evergreen protective hedge. Animals, including goats, normally do not browse on the leaves of Mesquite. The wood is considered useful for posts in fencing.

The Mesquite when well-esta-

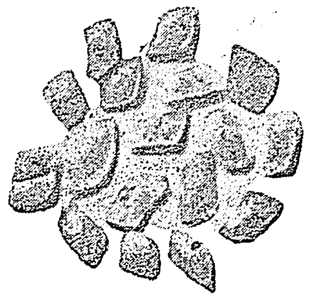
Mesquite thriving on the rocky ridge in Delhi

blished grows luxuriantly in very hot and dry situations. In fact, damp situations are unsuitable for it. With regard to the use of this introduced plant in forest afforestation, the most important factor worth considering is the nature of the seed and requirements for its satisfactory germination.

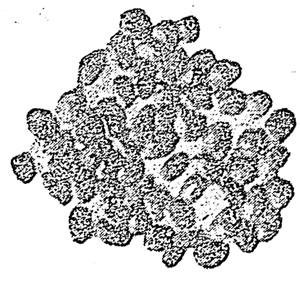
The seeds which have hard coats are individually encased in somewhat rectangular closed pocket-like structures formed out of the cartilaginous inner lining of the pod. These 'pockets' are embedded in the spongy pulp of the pod. Due to the cartilaginous nature of the 'pockets' and the sticky pulp, some effort is necessary to take out these 'pockets' from the pulp and the seeds from the 'pockets'. All these conditions are thus responsible for the slow and poor germination of the seeds under natural conditions, especially in areas of low rainfall such as the Rajasthan desert.

It has been reported that the germination of seeds recently sown in the Rajasthan desert ranged from 10 to 80 per cent in various situations, depending on the soil condition and moisture supply. Even after germination, there must be sufficient moisture for the young seedlings to establish themselves.

Grazing cattle, goats and sheep relish the sweet pods of Mesquite. The spongy sugary portion of the pods is digested, while the seeds,



Cartilaginous 'pockets' encasing the seeds



Seeds of Mesquite

which retain their viability, are passed out. These seeds germinate more rapidly when moistened by a shower of rain, thus helping natural regeneration.

In view of the difficulties experienced in seed germination and establishment of young plants in dry areas, the results of the air-sowing in Rajasthan may be watched with interest. General experience shows that direct sowings in drier areas are usually not satisfactory. However, the Mesquite if once established will solve the problem of desert afforestation.

RAISING MESQUITE

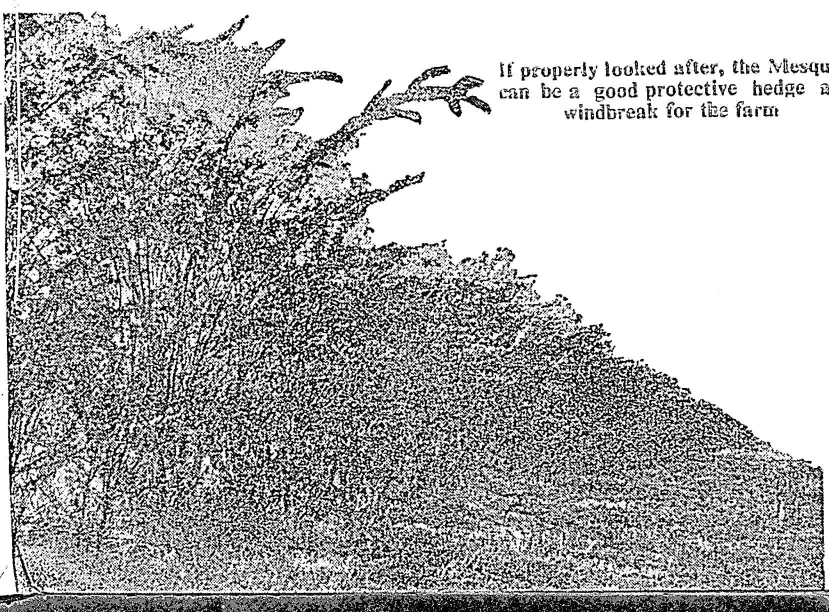
Farmers can use the Mesquite as a protective live fencing for their farms or for raising plantations in waste lands for fuel and for use as cattle feed. The following general hints will be found useful for the growing of this species.

Collect the pods in May-June or September-October and dry them thoroughly. Seeds collected during May-June can be sown immediately after collection and the seeds collected during September-October can be sown from the beginning of the following April.

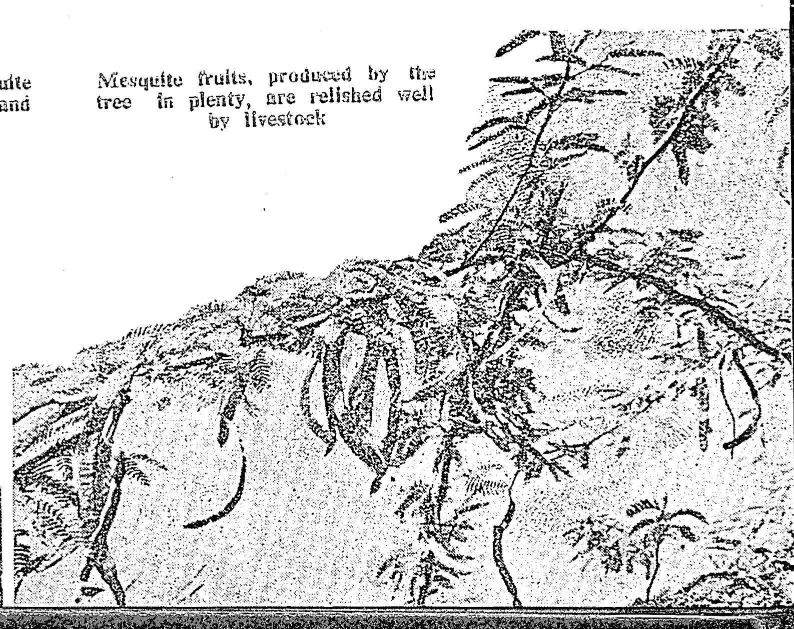
At the time of sowing, break the pods into pieces and soak in water for 24 to 48 hours. Isolate one-seeded 'pockets' by rubbing and separating the pulp. Sow the 'pockets' in flat nursery beds. Germination is usually slow and irregular. Frequent watering will be necessary.

Germination can be improved by treating the broken pods in sulphuric acid (1 part to 4 parts of water) for 24 to 48 hours to remove the pulp, etc., and then giving hot water treatment to the 'pockets' encasing the seeds (5 minutes at 70°C).

(*Continued on page 25*)



If properly looked after, the Mesquite can be a good protective hedge and windbreak for the farm



Mesquite fruits, produced by the tree in plenty, are relished well by livestock

SUGARCANE YIELDS NEED NOT BE LOW

By
R. D. BOSE,
Secretary,
Indian Central Sugarcane Committee

DURING the crop competitions for sugarcane conducted in Uttar Pradesh in 1950-51, a farmer in the Meerut Range produced an acre-yield of 1,803 maunds of sugarcane. In other cane competitions held in the State, farmers produced crops yielding 2,000 maunds per acre.

In Bihar, a local cane-grower secured 3,083 maunds of sugarcane per acre during 1951-52. Other cane-growers, with earnest efforts, have also been able to secure yields, surprisingly high for the State.

These high figures only show that given proper attention, a high tonnage of sugarcane can be realised even in Uttar Pradesh and Bihar where acre-yields have been ranging between 300 and 400 maunds per acre.

An analysis of how these farmers were able to produce many times the average acre-yield showed that they cultivated their fields in proper time with the country as well as soil-inversion ploughs, giving in all 14 such ploughings as preliminary cultivation. They planted the cane 3 ft. apart and used high-yielding cane varieties for planting. Heavy doses of farmyard manure or leaf compost and heavy doses of oilcakes and/or sulphate of ammonia were applied. They gave irrigation and inter-culture in time and paid proper attention to plant protection measures. Personal supervision of all agricultural operations also played an important part in getting them such high yields.

HELP FROM RESEARCH

In the field of sugarcane cultivation, the Indian farmer has, no doubt, made considerable improvement. Sugarcane research has helped him in no small measure to produce far better crops than what he used to do any time before. Yet, acre-yields of sugarcane are still far from satisfactory. In some areas, the yield position is very low and has not shown any tendency to rise and in some others shown a progressive decline.

The level of production in the North is between 300 to 400 maunds per acre, while in Peninsular India the average yields range from 900 to 1,000 maunds per acre. Even these yields are low when compared to the average acre-yield of about 1,700 maunds of Hawaii, 1,550 maunds of Java and 1,150 maunds of Peru.

The demand for sugar and *gur* in India is increasing day by day, necessitating the import of foreign sugar to supplement home production, and hence increasing our home production has become a matter of national importance.

Several factors contribute to improved cane production. Adequate irrigation facilities, use of disease-free and improved varieties of seed material, application of proper manures and fertilizers in the required quantities, use of better cultural and cropping methods and control of pests and diseases are some of them.

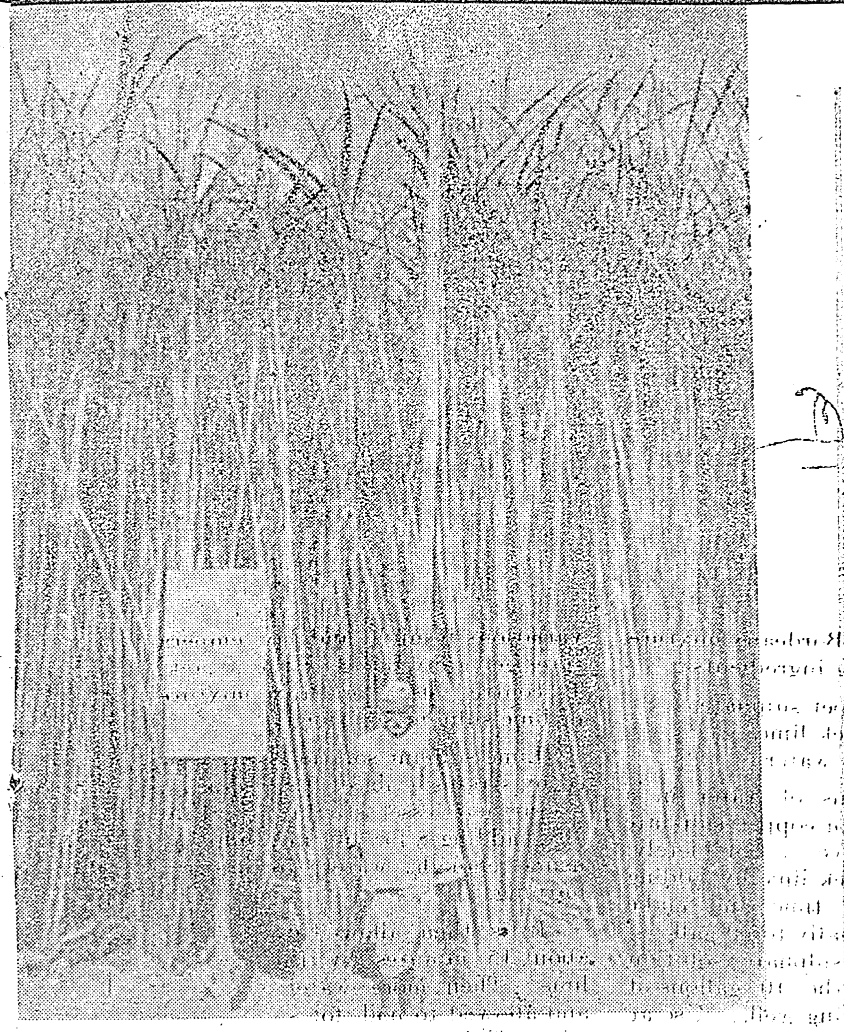
Intensive schemes for developing sugarcane have already been launched by the Indian Central Sugarcane Committee, and various State Governments with very good results. Yet, much more effort has to go in before we improve the production of sugarcane.

HIGH YIELDS

One important factor capable of improving sugarcane yields is the application of manures and fertilizers. Inadequate manuring appears to be one of the chief reasons holding up sugarcane yields at present in this country. Manurial experiments conducted in all the important sugarcane-growing areas have provided sufficient information to draw up manurial programmes for the crop. Thousands of tons of organic manures and chemical fertilizers are being distributed to cane-growers. Though quite a large number of cane-farmers have taken well to fertilizers, the average cane-grower, especially in North India, is yet to become fully fertilizer-minded.

Sugarcane is a crop that responds very well to manuring. Whenever a field is not manured or fertilized, the lack of nutrients in the soil can be

This is how an average crop of sugarcane in Uttar Pradesh lo

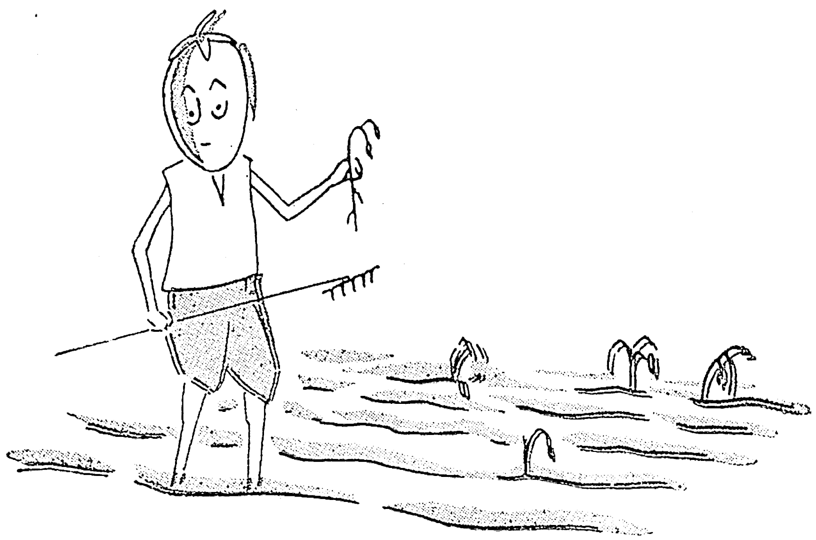


This is Shri Niadar Singh with his prize-winning sugarcane crop. He obtained an acre-yield of 1,303 maunds

easily noticed by the poor growth of the crop. Experiments have shown that nitrogenous manures and fertilizers have very good effect on sugarcane. Experts recommend an application of 80 to 120 lb. of nitrogen per acre for Northern India and a dose of 300 to 400 lb. nitrogen for Peninsular India.

The Government of India is formulating plans for inaugurating a campaign for increasing sugarcane yields throughout the country. During the current year, however, concentrated efforts are being made in the low cane-producing states of Uttar Pradesh Bihar and the Punjab to increase the per acre-yieds. Farmers are being encouraged to apply a top-dressing of ammonium sulphate to the present standing crop of sugarcane at about 2 maunds per acre and the fertilizer is being made available in these states on a loan or deferred payment basis to cover a lakh of acres each in Uttar Pradesh and Bihar and about 20,000 acres in the Punjab. Besides, arrangements have also been made to distribute 23,100 maunds of ammonium sulphate free in these states for demonstration purposes in the fields of selected cane-growers.

Farmers in these areas should do well to respond wholeheartedly to this scheme, and not only help the country produce more sugar to meet her requirements but also help themselves to better profits.



VEGETABLES NEED TO BE DISEASE-FREE

VEGETABLE farmers all over India come across diseases that cause reduced yields of the crops they grow for the home or the market.

A constant watch has to be maintained for the appearance of these diseases, and immediate action taken to check them if the crops have to be saved.

Many of these diseases can be controlled by the use of chemicals that kill the fungi that bring the disease. However, there may be cases where no remedial action is possible. In such a case, the only possible action that the farmer can take is to pluck out all plants infected with the disease and burn them so that the disease may not spread or the fungus remain alive. Such infected plants should not be thrown in manure pits, as a manure thus contaminated will be the cause for the start of the disease once again.

The vegetable-grower has many diseases to contend with. It will pay him to be able to know what particular disease it is that has attacked his crop and how to treat it.

POWDERY MILDEW

One of the common diseases that affect vegetables is powdery mildew. The foliage of plants like peas, tomato and brinjal sometimes are coated with a powdery ash-coloured substance. The disease causes the leaves to fall off, young shoots to wilt and die and prevent buds from developing or opening out into blossoms. Affected plants should be collected and burnt. Spraying Bordeaux mixture on the crop is the best-known remedy for mildew.

For preparing Bordeaux mixture, take the following ingredients :

5 lb. copper sulphate
5 lb. quick lime
and 50 gallons water

Place 40 gallons of water in a barrel, add 5 lb. of copper sulphate to it and dissolve it completely. Slake 5 lb. of quick lime by adding a little water at a time and make up the volume finally to 10 gallons. Add the copper sulphate solution (40 gallons) to the 10 gallons of slaked lime, stirring well. Use at once. Wooden vats are best for mixing. This Bordeaux mixture goes by the formula 5-5-50. For smaller quantities, use proportionate quantities of the ingredients.

A solution of potassium sulphide is also found effective. The general strength of the solution recommended is one ounce in three gallons of water.

DOWNY MILDEW

It is a disease similar to powdery mildew, with the difference that a downy, soft film covers the affected portions of leaves, making it all the more difficult for fungicides to act on them. Beginning as minute dots, the disease spreads rapidly. Big variations in night and day temperatures generally bring on the attack. To control, use Bordeaux mixture or lime sulphur solution.

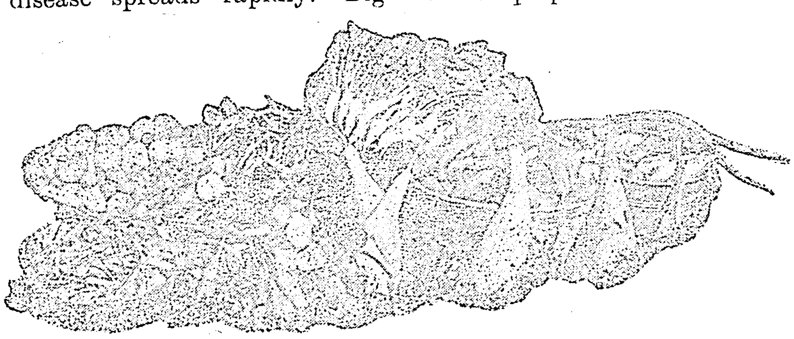
Lime sulphur solution is prepared by slaking 4 lb. of fresh lime in an earthen vessel stirring it gradually, adding 8 lb. of fine sulphur, using enough water to prevent burning.

It is then allowed to boil for about 15 minutes by the heat of lime. Then more water is added and allowed to boil for some more time. This mixture is diluted to 50 gallons and applied.

If lime sulphur solution is mixed with lead arsenate, it can be used against both insects and diseases.

RUSTS

Several kinds of rusts attack vegetables, usually cucurbits, tomatoes being the common victims. The disease can be identified by the appearance of yellow or orange or brown or dark spots on the stem and sometimes on the leaves too. Once the attack sets in, it is difficult to control rusts. Preventive measures like plant sanitation, good cultivation and preventive spraying usually can help in giving the crops protection.



Vegetables yield well if kept free of diseases

It is common to find rotting of roots, stems and fruits of cucurbits, tomatoes and artichokes. The usual cause for such a rot is over-watering, defective drainage or heavy texture of the soil. In soils where rot is common, disinfection by digging in lime will be of great help. Fruits susceptible to rot can be given a preventive spraying with Bordeaux mixture after they have set, but before they become large and ripen.

"DAMPING OFF"

Young seedlings often rot at or below the surface of the ground and fall over or wilt when they are known to "damp off". This is common in nurseries of tomato, brinjal, cauliflower, cabbage, etc. Adequate drainage, careful watering and thin sowings usually keep off the disease. Sprinkling sharp sand or charcoal powder over the surface of the soil helps in preventing the attack. Spraying with a very weak solution of formalin (formaldehyde, which is a poison) is also recommended.

Other diseases commonly seen in vegetables are what are known as little leaf, rosette, mottled leaf, die-back, etc. These are found more especially in soils which are dry, sandy or hard and deficient in organic matter. Application of well-rotted cattle manure, horse dung or urine helps in overcoming the diseases.

Sometimes a gum is seen exuding from the stems or roots of plants. This is known as gummosis. The bark from diseased portions should be cut out and a paste of Bordeaux mixture applied to these parts.

CHLOROSIS

When the foliage of the crop is seen in a pale yellow condition, it is called chlorosis. This is usually due to the lack of some substance such as boron, iron or copper in the soil. This condition can be rectified by applying small quantities of boric acid or ferrous sulphate (at the rate of 1/4 oz. per square yard) or by spraying Bordeaux mixture on the foliage.

Mercuric chloride (one ounce in 10 gallons of water), is a useful antiseptic wash for seed material to prevent diseases. Uncut seed potatoes may be soaked in this solution for half an hour before planting to prevent diseases.

THE FARM HOME

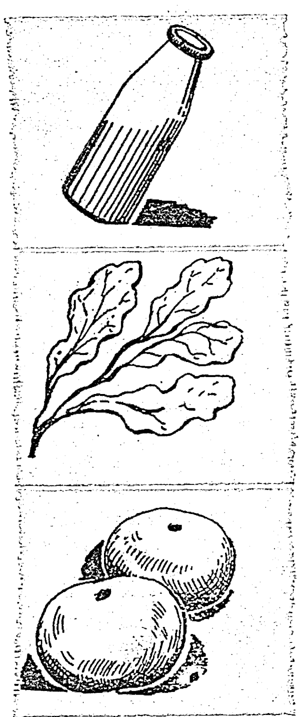
SHOULD A MOTHER FEED FOR TWO?

SOME HINTS REGARDING WHAT AN EXPECTANT MOTHER SHOULD EAT AND WHAT SHE SHOULD NOT

SHOULD an expectant mother eat for two ? The answer is yes and no. She should eat more of certain kinds of foods, but should not eat more than what she normally does.

Attention to the food of the expectant mother is important. The health and development of both mother and child will depend upon the nourishment she receives during the entire period of pregnancy.

The food she takes has to supply her own needs as well as those of the growing child. Naturally, she has to take some extra food, and not just what she takes usually.



The unborn baby draws heavily on the mother for the calcium it needs, the more so during the latter part of pregnancy. Calcium is needed for the building up of the bones and teeth. If the mother does not take extra calcium in her diet, the child's need for the substance will come from her bones and teeth. Thus both mother and child will suffer.

Just as calcium, the child needs iron, and draws heavily on her body store of iron. It is necessary that the mother's food should contain atleast fifty per cent more iron during this period.

The other important substances needed to be taken in the diet in larger quantities to ensure a good health both for mother and baby are proteins and vitamins.

RIGHT FOODS

Among the foods that supply these essential food factors to the mother, milk is the foremost, especially in the case of vegetarians. Milk is rich in vitamins, minerals and first class proteins. The expectant mother, nutrition experts advise, should drink as much milk as she can afford. Milk can also be taken as curd or butter.

Green leafy vegetables are also rich in vitamins and minerals. It is good to include them in the diet. Fresh fruits and sprouted gram deserve to be taken daily, even if in small quantity. Eating more of vegetables and fruits will help a good deal in relieving constipation which is generally common during the last two months.

Non-vegetarians can help themselves to moderate quantities of fish, meat and eggs and liver. Moderate, because these foods being rich in proteins, are more difficult to digest. It is good to cut them down still further in the last month of pregnancy.

RIGHT QUANTITY

The quantity of food should increase a little at the beginning of the fifth month, while during the last two or three months it is better to have four or five small meals instead of three heavy ones.

After the sixth month, the diet should chiefly consist of milk, green vegetables and fruits, and the quantity should be reduced during the last month.

The expectant mother can take tea, coffee and sweets in moderation. She should avoid over-eating, foods that do not agree, fried foods and alcoholic drinks. Watch weight. The mother should not gain more than a pound a month during the period.

WHAT'S NEW IN FARMING

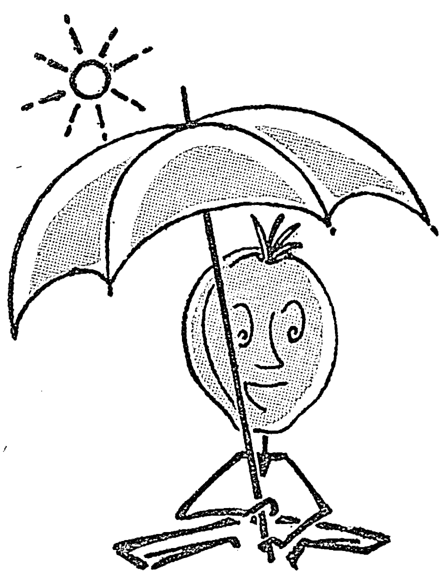
WHEREVER farmers raise coconut nurseries, they have to provide shade to the growing seedlings.

Shading is necessary to protect the seedlings from the scorching heat of the sun and minimise watering charges, as shade reduces evaporation of soil moisture.

Plaited or unplaited coconut leaves and bamboos are generally used by coconut-gardeners for shading coconut seedlings during the hot weather. Such shading material, apart from being costly, does not last for more than a season.

Efforts were made at the coconut research stations to find out suitable plants that would provide suitable shade to the seedlings and also could be grown as a live-hedge.

Sesbania speciosa and Agath (*Sesbania grandiflora*) were tried at these stations with good results. Sesbania was sown in rows in-between 5 to 10 rows of seed coconuts planted in each nursery bed. Agathi seeds were dibbled along the borders about four feet away from the nursery. Both the plants grew up well and proved to be excellent shade material.



Sesbania is a quick-growing plant, capable of putting forth an excellent vegetative growth and providing excellent shade for the seedlings. Two crops can be raised in a year (June-July and October-November), which can remain in the field till the flowering stage, when they can be cut and utilized for green manure. The plants do not require any special attention.

Agathi is also a quick-growing plant, the trunk growing erect and forming an ideal standard for fencing. Apart from protecting it from goats and cattle, the plant does not require any special attention.

Both these plants, apart from being a cheap means of providing shade to the seedlings, can also bring a small subsidiary income to the farmer.

INDIGENOUS INSECTICIDE

The powder of the rhizome "sweet flag" (*Acorus calamus*) has excellent insecticidal properties, experiments at the Central Rice Research Institute at Cuttack have shown.

Sweet flag powder was used at the Institute to control the insect pests of stored paddy. In the experiments, its efficacy was compared to chemical insecticides in use at present.

The chemical insecticides were dusted on bags of paddy at the rate of 1 lb. per 100 sq. ft. surface. Sweet flag powder was mixed at the rate of 2 lb. per 100 lb. of paddy. Results showed that the insect population was the least in grains treated with sweet flag. Loss sustained due to insect damage was again the least in the lot mixed with sweet flag powder.

In the method of applying the powder it was found that mixing the powder at 1 lb. per 100 lb. of paddy was found better than dusting the same on the bags at 1 lb. per 100 sq. ft. surface.

Even after the rice was treated with sweet flag and stored for a year, it did not show any unpleasant odour when cooked.

SHEEP AND WEIGHT

Sheep lose up to 15 to 20 per cent of their body weight during the scarcity periods extending from the last week of December to the end of February in the Punjab. This is partly due to the shortage of grazing and partly due to the cold weather. Experiments conducted at the Hissar Farm show that a combination of the following rations in the form of supplementary ration to grazing can help in avoiding the loss :

Crushed *guar* seed two ounces per animal combined with 12 to 14 ounces of hay, or *pala* leaves, or chaffed *guar* or fine wheat *bhoosa*.

If these are not available, 3 lb. of green berseem per animal per day will serve the purpose.

THE MINISTER HAS A WORD....

Excerpts from the circular letter of Dr. Panjabrao Deshmukh, Union Minister for Agriculture, to Ministers of Agriculture of all States

IF anywhere our farmers are slow to take to new methods, it is essentially due to lack of means, and hardly due to lack of desire. I, therefore, entertain much hope to repeat the success we attained in the field of better paddy cultivation with respect to other crops also.

I have already chosen sugarcane, and some steps have already been taken in this direction. I also want to take up *jowar*, *bajra*, cotton, jute and *ragi*. Wheat will follow in due course.

The fulfilment of this hope, it is obvious, requires a constant and hard work on the part of everyone concerned. There are many pitfalls we have to avoid, and many precautions to take.

Considerable responsibility in this has to rest on the shoulders of us all, and more so on the officers of the Agricultural Departments and the large number of people who will go out as Extension and Village Level Workers in our rural areas.

If the machinery we possess is fully geared up, and works with a singleness of purpose, I am confident we will have as astounding results with the other crops as we have had with paddy.

HIGH PRIORITY

You will agree that variety is no longer a factor limiting the yield of sugarcane in India. Coimbatore canes have now become world renowned. I am convinced that inadequate manuring is the factor holding up crop yields in the country, and in our programme of cane development, the creation of proper organizations for manure supply will be given the highest priority. High stress will be also laid on the provision of irrigation facilities. Co-ordinated efforts of state Governments, factory interests and development workers are needed to achieve a greater average yield.

Uttar Pradesh is undoubtedly the most important sugarcane-producing State in India, since it produces more than half of the country's cane. The average yield, however, is about half that of Hyderabad and Saurashtra, and much less than half of Andhra, Bombay and Madras.

Andhra, which produces the highest yields (except in 1951-52 when Bombay held that position) shows a consistent increase in averages, and Madras has come up well in 1953-54. Assam, Bihar and Mysore, on the other hand, show a progressive decline in yields.

Hyderabad and Bhopal's areas have been halved since 1951-52, and the acreage in Andhra, Uttar Pradesh, Madhya Bharat, Madras, Rajasthan has shown a steep fall. Saurashtra, like Andhra, has shown considerable improvements in yields.

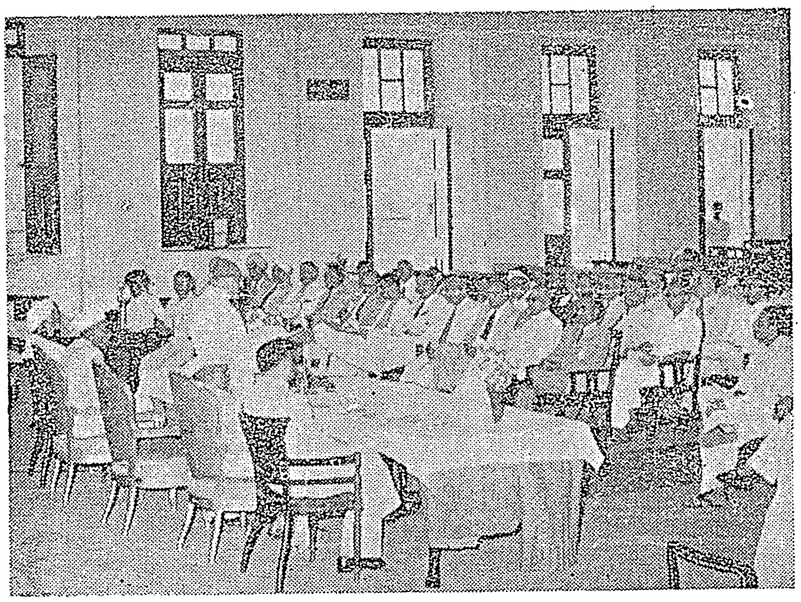
It has, however, been shown that there is ample scope for increasing the yields throughout the country, except perhaps in some parts of Bombay, Andhra and Madras where the yields are good. Even here, a little more effort will surely pay. It should not be difficult for us to increase the average yields by some 25 per cent.

COCONUT YIELDS

The average annual production of coconuts of 3,400 million nuts in this country is not adequate for our present needs necessitating the import of some 55,000 tons of copra annually. According to estimates our increased demands can be met if an additional annual production of 80,000 can be reached during the second Five-Year period.

This target, again, is not difficult of achievement. I am assured that even if adequate plant production measures alone are taken, and

Dr. Panjabrao S. Deshmukh, Union Minister for Agriculture, addressing the Opening Session of the Crops and Soils Wing of the I. C. A. R. at Bangalore in April last. He pleaded for a freer flow of information from the laboratory to the field so that quicker improvement in Indian farming could be achieved



the nuts which are capable of ripening are protected, it would be reached without bringing any additional area under the crop.

Our first aim should, therefore, be aimed at an extensive and efficient plant protection service for the entire coconut-growing area, so hat our average production of 29 to 30 nuts per tree may be increased to 40 nuts per tree.

RICE POSITION

Reverting to rice, I find from available figures that India's acreage under rice is 45.5 per cent of that of Asia (excluding China) and 32.6 per cent of the whole world (excluding U. S. S. R.). The total production, however, is just over a third of Asia and just above a fifth of the world. Regarding average per-acre production too we occupy a low place. Malaya has 50 per cent more yield per acre than India, while Formosa has 2½ times as much. Burma is ahead of us by 25 per cent. South Korea has thrice, and Japan nearly four times our per-acre yields.

I have given these details only to point out the important position we occupy on the rice map and the immense possibilities we have of wiping out our rice deficit.

It is indeed gratifying that we have been able to achieve good progress already in this field. When we consider the 1953-54 figures, we find that our acreage has gone up to 76.6 million acres and production to 38.5 million tons. Imagine, a mere five per cent increase over this yield will mean 20 lakh tons, which can not only meet our needs, but also give us a certain amount of surplus. In terms of the Japanese method, it means putting an additional four million acres under the method, which at the most conservative estimate of half a ton of additional yield per acre, should give us what we want.

Two million acres fully and 4 million partially under the Japanese method would be another way of achieving the same result.

(*Continued from page 17*)

Transplant young seedlings, nine inches to two feet or more in height, depending on the age, during July-August or earlier if irrigation facilities are available. Older saplings develop deep roots in the nursery, which are sometimes damaged in lifting; the lower portion of such roots should preferably be pruned at transplanting. To establish the transplants sprinkle water after transplanting if there is no rain. As a live fencing, it is advisable to plant two adjacent rows about 20″ apart, spacing the plants one foot apart in the rows. The plants in the two rows should preferably be planted alternatively. During the first year or two the young plants are liable to be damaged by termites under dry conditions. A closer planting is, therefore, recommended so that the final stand does not look very thin.

The basal side branches of young plants, which tend to grow prostrate, may be trimmed off leaving the main shoot to develop into a trunk.

When planted as a fencing for the farm, regular pruning after the second or third year is desirable so that the crops growing by the side of the hedge are not affected by the shade of overgrown Mesquite plants.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

Editor

COTTON COMES TO THE ANDAMANS

RESULTS OF PRELIMINARY EXPERIMENTS POINT TO NEW POSSIBILITIES

By **K. DHARMARAJULU**

WITH a geographical situation more or less similar to the West Indies, and with a rainfall ranging from 50 to 60 inches, the prospects of cotton cultivation in the Andaman Islands appear to be bright. One significant feature, which was evident from the few trials undertaken in recent years with Sea Island and Kidney cottons in those Islands is the absence, for the present, of any serious pests or diseases of the cotton crop.

After the visit of the Vice-President, Indian Council of Agricultural Research, to the Andaman Islands, a suggestion was made that cotton might be included in the list of crops that might be tried in the Islands. Seeds of the Sea Island and Kidney cottons were supplied in 1949 by the Secretary, Indian Central Cotton Committee, for trial.

The reports of the Agricultural Officer, Port Blair, indicated that the seeds were sown in the middle of June, 1949. While the germination of Sea Island was poor, that of Kidney was quite satisfactory. The plants after a poor start showed rapid growth after September and reached a height of 3 to 3½ feet, with good branching. The cottons came to harvest by the middle of January, 1950, and pickings continued till March. The yield of Sea Island was calculated to be about 50 lb. and that of Kidney at 80 lb. per acre. Except for some slight damage by a borer, there was no major attack by any pest or disease. Samples of Sea Island and Kidney cottons were sent to the Technological Laboratory for examination.

The experiments with these cottons were conducted at the Junglighat Farm, where it was grown on terraces. The soil of the Farm lands was poor, being gravelly. The rainfall was heavy, with a very short dry period intervening. The second lot of seeds was sown in May, 1951, over an area of 60 cents, the spacing between plants being six feet in the row and six feet between the rows. The crop was harvested in December of the same year. The yield obtained was extremely poor. Subsequently, the plants were ratooned and necessary weeding and inter-culture were carried out. These ratooned plants were in full bloom in the month of October, 1952, and a few bolls were produced. About 60 bolls were collected during the succeeding months of November-December, 1952, and January, 1953.

It is stated that the low yield was due to the heavy shedding of flowers caused by cyclonic weather at flowering time. Furthermore, weed growth is said to have been very luxuriant, in spite of measures taken to check their growth. Side by side with Sea Island and Kidney cottons, a few plants of Moco were also raised.

Notwithstanding the rather poor performance of the Sea Island and Kidney cottons, about three pounds of seed of the former are said to have been distributed amongst the cultivators, and another 2½ lb. sown on the Government farm for multiplication of seed. An attempt appears to have also been made to grow it in coconut plantations, and its performance under these plantations appeared to have been much more encouraging. It has also been suggested that the trial of the annual varieties also would be worthwhile. It is proposed to try some of the long duration types, which can stand a period of heavy rains in these Islands.

In this connection, a few of the promising American cotton types, *viz.* H. A. 11, M. 4, Madras Uganda 2, Acals 44, Delta Pine, Messilla and H. 105 which had been included in the cotton varietal trials conducted in the vicinity of Bombay, where the rainfalls is as high as 90 to 100 inches, might with advantage be tried in these Islands. The results with these annual cotton varieties will be watched with interest.

GRADING TOBACCO BY "AGMARK" STANDARDS

The way quality tobacco is assured to buyers at home and abroad

By
P. L. TANDON,
Chief Inspector, Tobacco Grading, Guntur

Grading of tobacco leaf is in progress. Plenty of care, patience and practice are required for this work.

THE Indian Union today is one of the principal tobacco-producing countries of the world occupying the third place after the United States of America and China. The total area under tobacco during the year 1952-53 was estimated at 1.01 million acres with a total yield of 870.42 million lb.

Though both the species of *Nicotiana tabacum* and *Nicotiana rustica* are cultivated in India, the former plays a far more important role in the foreign trade as well as in the tobacco industries of the country. The average annual exports of tobacco from India amounted to 86 million lb., valued at 13.25 crores of rupees during the five-year period ending March, 1953. The average annual quantity of tobacco cleared for home consumption for the corresponding period amounted to 471 million lb.

Under the cigarette type, Virginia tobacco of varying degrees of excellence and quality is produced in the country. The high colour of the Indian Virginia leaf has given it a distinctive place in the tobacco industries of the United Kingdom.

CULTIVATION

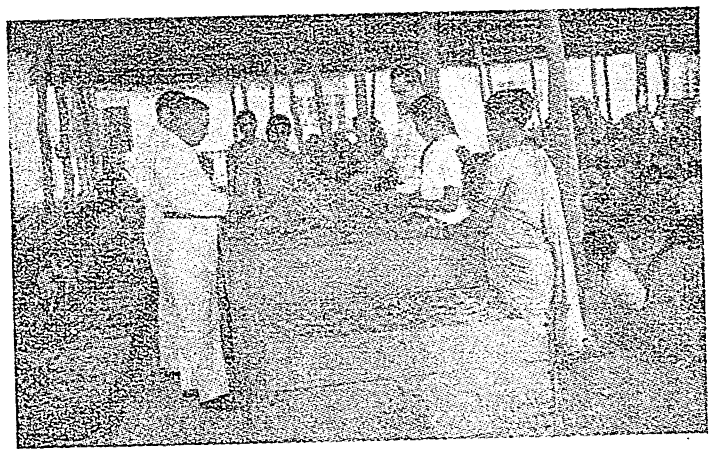
Virginia tobacco seed is sown in the month of August on specially raised 6″ high seed beds of 4′ × 50′ dimensions, using 2½ lb. of seed per acre. Beds are worked out with sand and manures to facilitate good germination and growth. When the seedlings are about 5 or 6 weeks old, they are transplanted, usually in the month of October and November at 27″ × 27 or 33″ × 33″ spacing (about 8,000 and 5,760 plants per acre respectively). The crop is rain-fed and not irrigated. The harvesting is done from the end of December to the beginning of March, 8 to 10 weeks after transplanting, picking the leaves, as and when they mature, in 5 to 6 pickings. The leaves are strung together with jute twines. A slat of 5′ length is used for tying 14 to 18 pairs of bunches of leaves, each bunch containing three leaves.

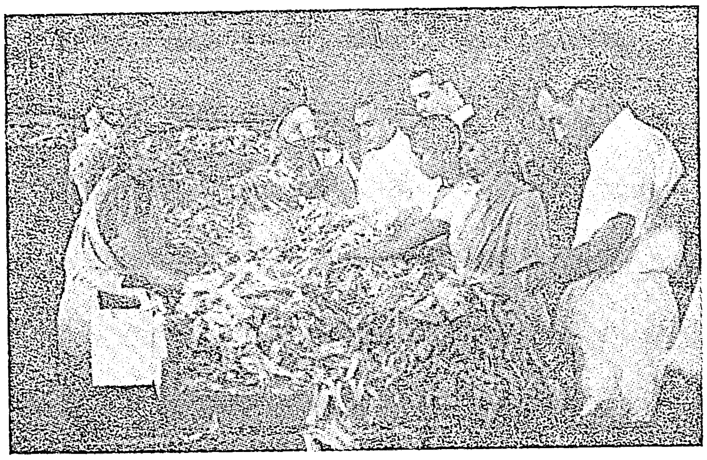
CURING

The bulk of the Virginia tobacco produced is cured in flue-curing barns. The main principle of barn curing is to dry the leaf under controlled conditions of humidity and temperature whereby the required lemon yellow colour and aroma are obtained.

The barn is a masonry structure of the dimensions either 20′ × 20′ × 20′ or 16′ × 20′ × 20′ provided with a furnace, a door, observation windows and top and bottom ventilators. Flue pipes of mild steel run from the cast iron pipe attached to the furnace into the barn along the sides and at the centre to provide the necessary heat. Twenty-one to twenty-five racks are arranged in the barn in 4 or 5 tiers on which the strung slats are loaded. The usual capacity of a single furnace barn is 500 to 600 slats.

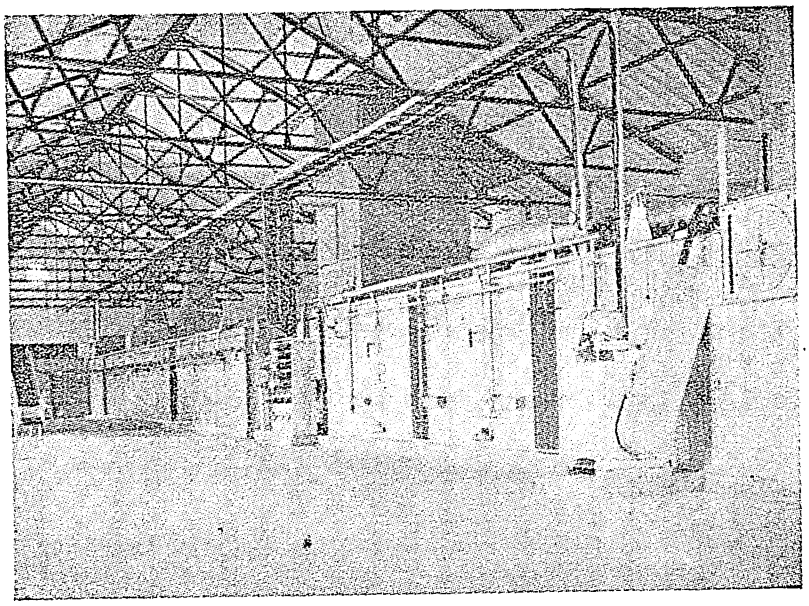
Graded tobacco is being carefully checked





Checking of the Grades is thoroughly done before tobacco is sent for bulking

Leaves are stemmed after grading. Here the work is in progress



Graded tobacco is sent to factories such as this for redrying to bring down the moisture-content

The curing is done in three stages : (1) yellowing the leaf, (2) fixing the colour and drying the leaf and (3) drying the mid-rib.

Yellowing : The temperature is kept at 90 to 100° F. Throughout this stage, the door and ventilators of the barn are closed. Leaves gradually turn yellow within 30 to 40 hours.

Colour fixing : Temperature is gradually raised from 100 to 120°F. It is at this stage that the yellowing of the leaf is accomplished. The top and bottom ventilators are opened to remove the moisture for rapid drying of the leaf. This takes 10 to 12 hours and then the temperature is gradually advanced from 120 to 150°F. The total time taken in this stage is 40 to 45 hours.

Drying the mid-rib : The ventilators are gradually closed again for conserving the heat and the temperature is advanced to 160°F and kept at that level till the mid-ribs are dried. This takes 30 to 35 hours.

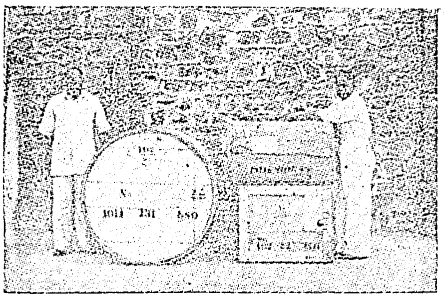
The whole process of curing takes 100 to 120 hours. The cured leaf when taken out is dry and brittle. So it is kept overnight on racks in the sheds to become soft and pliable for easy handling. The leaves are then removed from the sticks and piled.

For sun-curing, tobacco leaves are strung together with jute twines and hung in the sun on open racks. The leaves gradually turn yellow or brown and dry in a month. Precaution, however, must be taken to see that they are not damaged by rain.

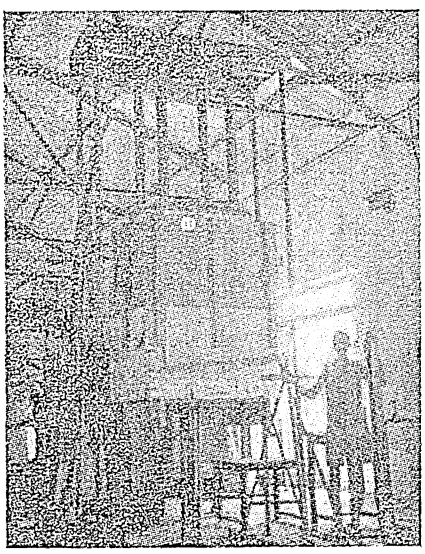
GRADING

The tobacco-grower usually takes his produce to the purchaser in a roughly graded form. At the grading centres it is sorted out and graded according to different Agmark Grades.

This grading is done on the basis of colour, texture, body and condition of the leaf. For example, for the Agmark Grade 1, the colour of the leaf must be bright lemon or bright orange ; the texture should be fine and the leaf must be com-



Redried tobacco is packed in bales cases or hogsheads



A chain or hydraulic press is used for baling

Each tobacco package is opened and samples are inspected from different layers to determine the grade

pletely free from any blemish or scalding or sponginess, etc. The colour and texture specification for Grade 2 leaf is almost the same, but blemish up to 5 per cent is permitted. For Grades 3 and 4, however, yellow to light orange colour has been specified and the texture should be medium with 10 and 25 per cent blemish, respectively.

Women are usually engaged for this work as it requires a lot of care, patience and practice. In the grading hall, the women sit on the floor in rows. For each row, there is a woman Line Supervisor who issues the tobacco for grading. When a worker has graded about one pound of leaves, she ties the leaves of different grades in different bundles. The Line Supervisor collects all the bundles separately discarding any bundle which is not graded properly. These are shown to the Head Supervisor who examines each bundle again and picks out any odd leaf not falling into a specific Grade. The leaf bundles are then taken to bulking rooms, checked again and bulked. In large concerns, the graded tobacco is removed to tables where the check-graders examine it carefully and transfer it to cases or for bulking.

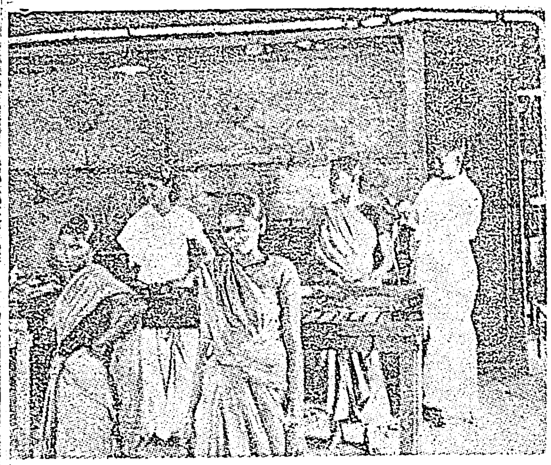
The leaves after grading are stemmed by removing a ⅔rd portion of the mid-rib or at least 50 per cent of the length of the leaf. The leaves after the removal of the mid-ribs are known as strips. This is done by hand or with a V-shaped knife fixed to a deal wood box.

REDRYING

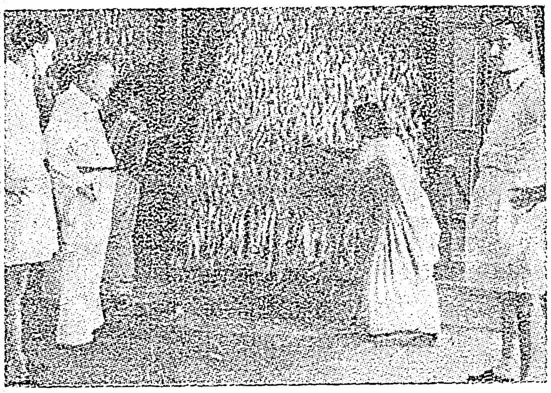
The graded tobacco is sent in baskets or cases to the factories for redrying. The main purpose of redrying is to bring down the moisture-content in the tobacco to a point where sweating and aging may take place without adversely affecting the quality. The most ideal range of moisture-content in tobacco is 10.5 to 11.5 per cent.

The redrying plant consists of three distinct sections : (1) Dryer, (2) Cooler and (3) Orderer. The tobacco is passed through the various chambers by means of an apron.

The Dryer in most of the factories is worked at 160 to 180°F depending on the type and the grade of tobacco. In this chamber, the tobacco be-



at the redrying factory, frequent sampling is done to check purity of the grades



Workers are seen sampling a lot of graded tobacco

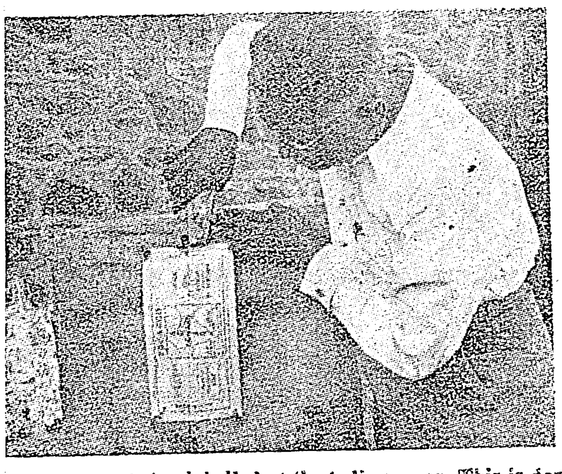
comes more or less bone-dry and may contain 6 to 7 per cent moisture. The tobacco then passes to the cooling chamber where it is cooled and the temperature in the chamber is maintained at 100°F. Finally, it passes into the third chamber known as the "orderer" where only steam at low pressure or steam and water in the form of a fine spray are injected simultaneously to form a mist so that the required amount of moisture is absorbed by the tobacco.

Redried tobacco is packed in bales, cases or hogsheads in lumps of 220 to 250 lb., 350 to 440 lb. and 880 lb. respectively. The baling is done by either chain or hydraulic press. In the case of bales, water-proof paper, mats and gunny cloth are used to cover all the sides. For cases, only water-proof paper is used. In hogsheads, no paper is used at all. Packages are weighed, numbered and stencilled with weight and grade as assigned by the grading officer and other marks.

EVILS IN TRADE

Till the last ten years or so, the quality of tobacco shipments from India was not often up to the required standard and there were frequent complaints from overseas buyers. The marketing survey conducted by the Agricultural Marketing Adviser to the Government of India also revealed immediate need for standardizing the methods of grading and packing of tobacco. The first step towards the improvement of agricultural marketing in India was the passing of the Agricultural Produce (Grading and Marking) Act in 1937. Further steps could not be taken due to the War. An Indian Tobacco Association was formed at Guntur and a scheme of voluntary grading of tobacco was introduced in 1937. This, however, could not attain any success. The evil of palming off of doubtful qualities of Indian tobacco to the English market prevalent in the tobacco export trade, therefore, remained unchecked. Consequently, considerable quantities of Indian tobacco were held up in the United Kingdom ports pending settlement of disputes regarding quality.

The abuse of mixing inferior grades and adulterating tobacco with extraneous matter increased so much that it was feared that Indian cigarette tobacco would lose its foreign markets for ever. thus impairing the country's reputation in the international trade. Meanwhile, the Indian Tobacco Association, Guntur, introduced a system of certification of tobacco consignments by a certifying committee to have some quality control over the exports.



The packages being labelled at the baling press. This is done under the direct supervision of an inspecting officer.

Graded and marked tobacco is being check-sampled by senior officers before it is sent for shipment

Even about the working of this Committee, there was a good deal of dissatisfaction. Finally, the Government of India prohibited the export of flue-cured Virginia, sun-cured Virginia, sun-cured "Natu" (country) and Motihari varieties of tobacco unless they were graded and marked in accordance with the rules framed under the Agricultural Produce (Grading and Marking) Act of 1937 and certified to that effect by an officer authorised for the purpose. The grades prescribed under the Agricultural Produce (Grading and Marking) Act are known as "AGMARK" grades. The grade standards were defined in due consultation with the trade interests in India and also the foreign buyers.

AUTHORISED PACKERS

Any person or firm desirous of grading and marking tobacco is required to apply for a certificate of authorisation on a prescribed form to the Agricultural Marketing Adviser to the Government of India, New Delhi, through the Chief Inspector, Tobacco Grading, Guntur. A duplicate copy of the application is also required to be submitted to the State Marketing Officer of the state where the applicant desires to carry on the grading operations. The Marketing Adviser after satisfying himself about the *bonafides* of the applicant issues the certificate. Certain conditions are imposed on the authorised packers and those who fail to observe the rules and instructions are liable to forfeit their authorisation.

The correct grading of tobacco under the rules prescribed is the responsibility of the authorised packer. The Tobacco Inspectorate is also required to see that all consignments of tobacco exported out of India conform to the prescribed standards. With this object in view, the Inspectorate keeps a continuous watch on all the operations, namely, grading, stemming and redrying and the actual packing of tobacco.

ISSUE OF CERTIFICATES

The inspection of tobacco packages is done by opening each package and drawing samples from different layers to determine the grade.

At the redrying factory, as each lot of different grades of tobacco is run through the redrying machine, frequent sampling is done at the feeding and delivery ends of the machine, and also before the tobacco is passed through the baling press. The Agmark Grade labels are applied to each package at the baling press under the direct supervision of the inspecting officer. The labels are issued in duplicate to the authorised packer by the Inspector. One is inserted in the inner side of the package while the other is fixed on the outside. The package is then sealed under the supervision of the Inspector. The labels bear such particulars as variety and grade, year of harvest, date of packing and date of inspection. The Inspector puts his signatures on each label. The Agmark label also bears a serial number.

The graded and marked tobacco is check-sampled to the extent of 2 per cent or more, if necesary, by the Chief Inspector, Tobacco Grading or the Senior Inspector or any officer specially authorised for that purpose, before it is sent to the port of shipment.

As a further measure of safeguard, checks are also carried out by the Chief Inspector or other officers to detect any faulty grading or cases of deterioration of quality or weevil infestation in transit or storage. During this check-inspection, if the packages are found shapeless or broken or badly ground-touched or badly graded or overfermented or scorched, they are detained, labels and seals are removed and cancelled and the authorised packer is informed accordingly.

A certificate of Agmark grading in triplicate is issued on the prescribed form to the authorised packer after the tobacco has been labelled, sealed and check-sampled. The certificate includes such particulars as variety, year of harvest and Grade together with Agmark label numbers and the party's shipping numbers and identification marks.

"AGMARK" SUCCEEDS

The average annual quantity of tobacco graded for export for the five-year period ending March 1953, works out at 88.7 million lb., valued at about Rs. 10.5 crores. The Agmark system of grading tobacco is playing a very important and useful role in developing the tobacco export trade of the country on sound lines. It has increased the confidence among the foreign buyers about the quality of tobacco shipments and enhanced the reputation of the country in the international market for delivering goods in accordance with standards of quality. Due to this increased confidence, the foreign buying firms freely advance large sums of money to Indian exporters for supplying tobacco on the basis of Agmark Grades.

Some of the buyers in the U. K. have placed firm orders for the supply of Indian tobacco. Letters of Credit for the full value of tobacco are opened in the local banks and such credits are operted by the Indian shippers on the production of certificate of Agmark grading together with the shipping documents.

Many of the cigarette manufacturers in India also prefer to buy their requirements of unmanufactured tobacco on the basis of Agmark Grades.

The foreign buyers now offer price quotations on the basis of Agmark Grades so that the farmer is able to know whether the price offered for his produce in the local market is fair and reasonable.

The variations in prices realised by different exporters for different grades have been minimised. The price differences from grade to grade have become more or less uniform.

Increasing recognition is being accorded to the Agmark grading certificates by the local banks and financial agencies who readily advance monies on the pledge of graded and marked tobacco.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

Questions & Answers

Q : Mango trees in my garden bear flowers, but no fruits are produced. Can you indicate any reason for this ?

A : It is presumed that the trees in your garden not only bear flowers but also set fruits. It is quite possible that the fruits drop off when small. If this is the case, in all probability it is due to a deficiency of nitrogen in the soil. It may also be due to some pest like the mango hopper which causes fruit to drop. In any case, it is advisable that the local Agricultural Officer is contacted and his help sought to eradicate this trouble.

Q : Please let me know whether applying one bag of ammonium sulphate, one bag of superphosphate and one bag of lime to my paddy crop will have a good effect ? I intend applying half a bag of ammonium sulphate to the nursery and half a bag to the crop after transplantation.

A : Lime is applied to correct the acidic nature of soils usually in Bengal, Madras and Orissa. Unless you are sure your soils are acidic, you need not apply lime. It is presumed that the above doses you have given are for an acre. In that case, half a bag of ammonium sulphate to the nursery is too high a dose. You need apply 20 to 25 lb. of ammonium sulphate to the nursery. Application of 80 lb. of ammonium sulphate to the crop generally gives an additional yield of 2 to 3 maunds per acre. Regarding superphosphate, a dose of 100 lb. per acre applied two or three days before transplantation gives good results. You may also note that application of nitrogenous fertilizers beyond 40 to 45 lb. of nitrogen per acre to the paddy crop is not only a waste but may also have a very depressing effect on the crop.

(*Continued from page 6*)

enabled the Dairy to flourish; this has again made maintenance of dry animals possible.

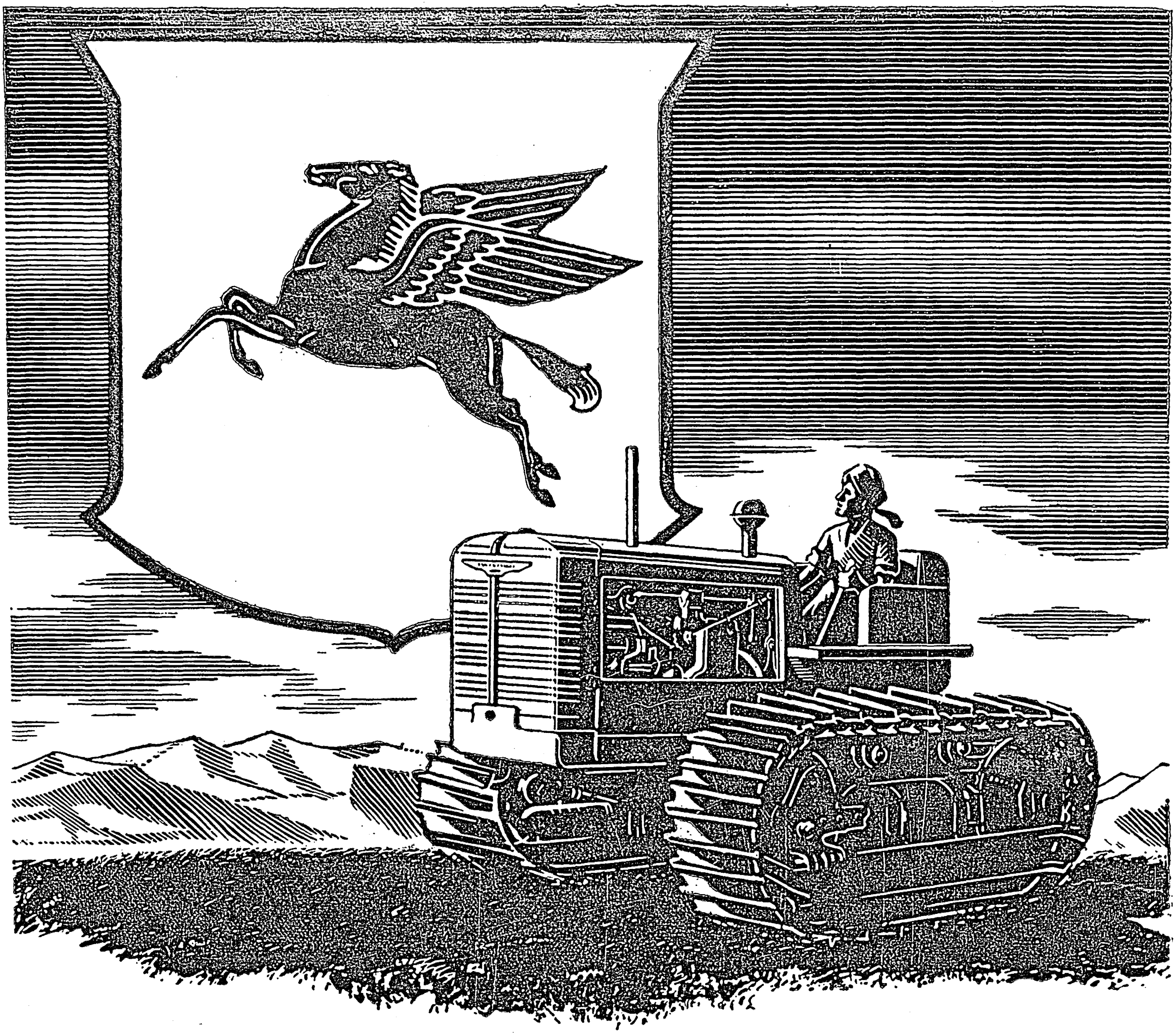
ANOTHER ACHIEVEMENT

The Japanese method of paddy cultivation is also a favourite with the "Adarsh". Rice on this Farm is generally cultivated by this method and the entire needs of the Farm staff are met from the produce obtained. The "Adarsh" won the first prize for obtaining a paddy-yield of 73 maunds per acre by this method, in 1952-53. The achievement becomes all the more significant when it is taken into consideration that an area of 40 acres was entered in the competition.

The partners believe in giving a sound agricultural education to their children so that they can be of actual help to them in running this business which they have been able to stabilise after years of hard work and patience.

When I left the Adarsh Dugdhalaya, I carried a lasting impression on my mind—the owners of this Dairy are working scientifically and in a spirit of service. It was easy for me to conclude that twenty years of hard work, planning and unswerving devotion to their ideals had enabled the three partners to realize their dreams. The Dairy, started on a very small scale about 20 years ago, has today bloomed into a huge organization and is one of the biggest private enterprises in the country.

Regd. No. D-571



The farmer too ... looks to the *FLYING RED HORSE!*

The farmer is doing a vital job for the Nation — and he is working with costly machinery. That gives him two good reasons for choosing his lubricants carefully! No wonder so many farmers choose Mobil and Delvac products . . . made by the makers of famous Triple-Action Mobiloil.

If you would like to know the correct type of lubricant for your farm equipment, write to us stating make and model. We will gladly give our advice, backed by 88 years of leadership in the oil industry.

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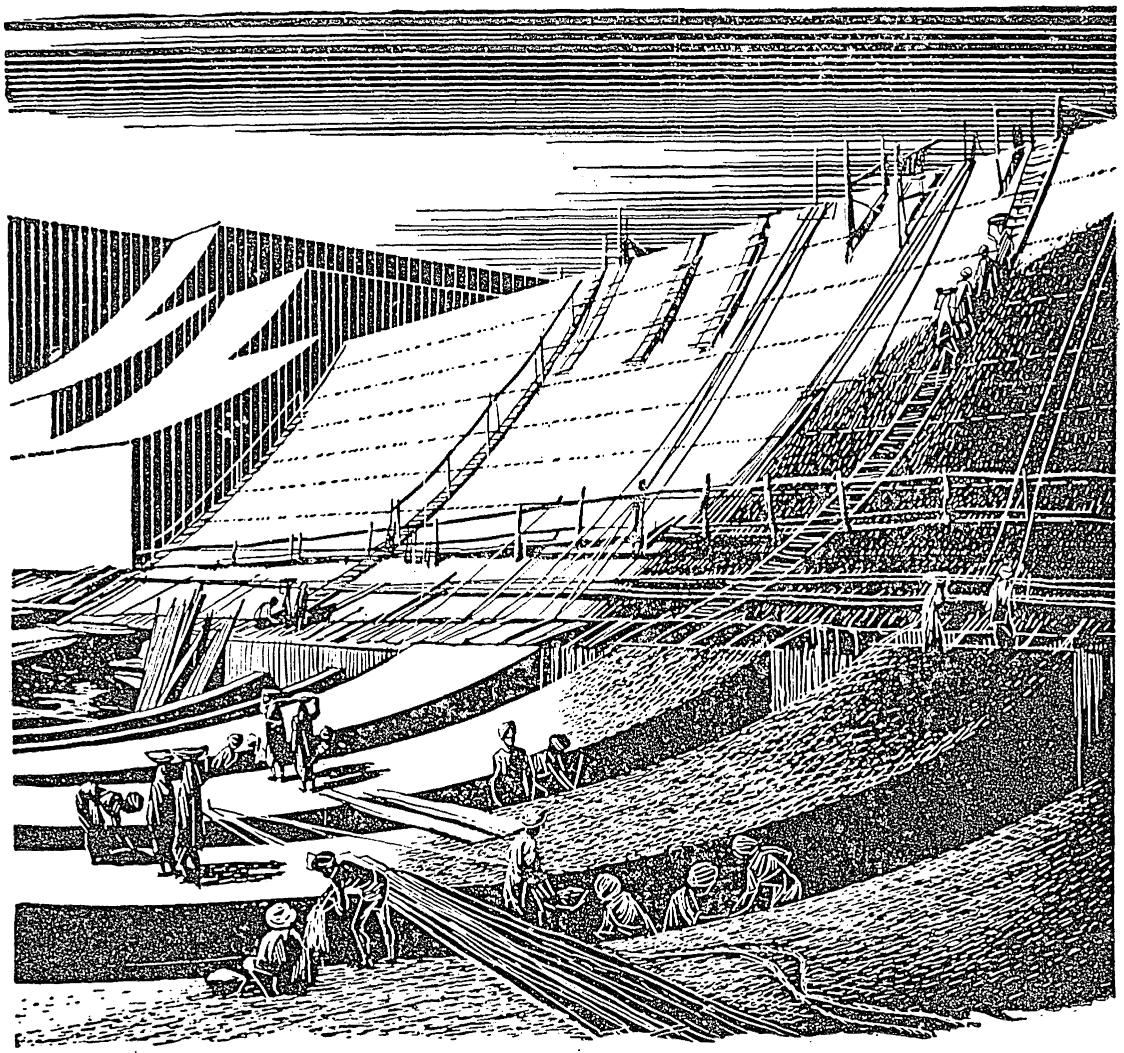
Indian Farming

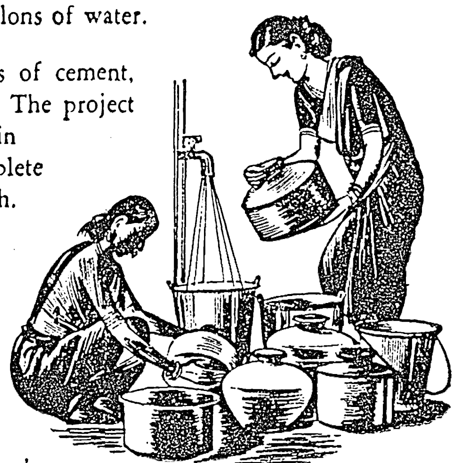
JULY 1954



100 million gallons more water per day for Bombay

The Vaitarna-cum-Tansa project, undertaken by the Bombay Corporation, includes damming of the Vaitarna River. This will create a storage reservoir with a capacity of 46,000 million gallons of water.

200,00,000 cubic feet of concrete, using 1,40,000 tons of cement, are needed for the construction of the Vaitarna Dam. The project will nearly double the city's daily water supply; which in turn will ease the water scarcity in Bombay, help complete new residential colonies, and further industrial growth.



Great projects like this ensure better living; call for vast quantities of cement. The ACC is helping to achieve National Targets by producing more and more quality cement.

For free technical assistance on any problem of concrete construction, please write to The Concrete Association of India, 1 Queen's Road, Bombay.

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Indian Farming

VOL. IV JULY 1954 No. 4

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Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

Editor's Page

PLANTING TREES

A few years ago, a Southern journal, claiming a wide readership, dismissed the tree planting campaign in its leading article as nothing more than a " fad ". It went out at length to forecast that if pursued, the campaign will only entail in a big wastage of energy and money without bringing in any perceptible benefits to the people.

Four years later, the same journal had a different story to tell its readers. In another leading article, it took serious notice of the growing menace of soil erosion, the dearth of fuel for rural homesteads, the lack of sufficient cattle fodder and the poor capacity of soils to bear good crops, and traced all these evils to the inertia shown by the people to tree planting. It fervently appealed to its readers to put in all efforts in re-planting the denuded countryside if things were not to go from bad to worse.

This swingover is just another example of how more people have come to realise the folly of thoughtless tree-felling without making any amends to nature. The upset balance in nature has brought in its train the series of evils that the rural dweller is today experiencing—erratic rains, fodder and food famines, fuel scarcity and poorer crops.

The realisation has not come a day too late. For years, the individual has been under the conception, though wrong, that the planting of trees is the concern of the Forest Department and he need not bother about it. The fact that the individual constituted the state and that he had to play a valuable role in rural reconstruction was not paid enough attention.

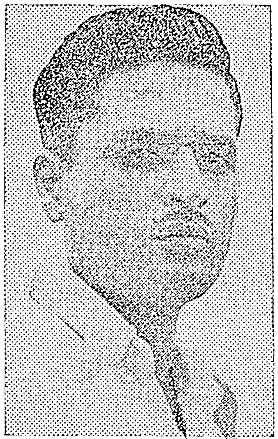
No progressive nation in the world can afford to neglect its forests. This is all the more so in a country like India where the majority of the states are yet to put the optimum area to tree raising. In many a country the celebration of ' arbour days ' has served to focus public attention to the need for fresh plantings and on an increased measure. This work benefits the individual as much as the nation.

In tree-planting, apart from community action, the individual and especially the rural dweller can and should play a bigger part. In some of the Western countries stress is being laid on the raising of what are called ' farm forests.' Here, the farmer sets apart a portion of his land exclusively for the raising of the trees for which he has immediate need in the home or the farm. Such farm forests can be so planned as to serve other purposes as well. The forest can be a wind-break, a shelter for the farm cattle, apart from adding to the charm of the landscape. The idea of raising a farm forest should, therefore, appeal to those farmers who have a sufficient holding to apportion a part of the land for this purpose. For those who do not have this advantage, there are quite a number of places on and about the farm such as farm boundaries, field bunds, pasture lands and sides of canals. Farmers, big and small, should make it their duty to raise trees, with utility as the main deciding factor in the selection of the species, in greater numbers and thus defeat those factors which are playing havoc with farm and rural life.

OUR COVER

" Line-planting would give better tillering of the crop." These Village Level Workers are explaining to a farmer the advantages of adopting the Japanese System in rice cultivation. Today, Village Level Workers are playing an important part in the plan for agricultural development in India's villages.

Farmers I have met



MAKING THE BEST OF POOR RAINS

"EVEN when we used to receive a normal rainfall, my wells used to go dry and remain dry when I still needed water for cultivation. Now, with even half the average rainfall the last three years, my wells are giving me copious water sufficient for my irrigational needs."

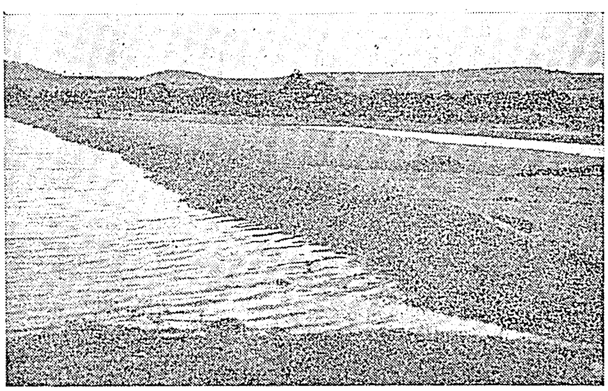
This was what Shri Ravindra Wandrekar, a farmer in the Poona district of Bombay State, told me when I met him in the first week of this month.

The farmer, who had lost the dread for scarcity conditions, disclosed to me that what made the big difference was the putting up of contour bunds on his farm. Good, well-built bunds all over the farm locked up rain water, which instead of flowing away to waste and taking some good soil with it in the process, now sinks into the ground and is available to the growing crops.

The bunding work was got done cheaply, efficiently and quickly because he sought the help of the Soil Conservation men of the State Department of Agriculture. Since the area of his farm was less than the minimum required for the Department to undertake the work, he had to persuade his neighbours to join him in getting the farms bunded.

The farmers who had not very readily agreed to join him in his plan then have now, after what they have seen during the three years, realised what a valuable help bunding is in farming.

Shri Ravindra is a Graduate in Agriculture and is one of the few educated men that have preferred farming to other vocations.—**M.G.K.**



Rain water caught by the bunds. The picture was taken after a shower.

Man of the Month

METHODS THAT HELPED DHANDA FARMER RAISE RECORD MAIZE CROP

by

HARKIRAT SINGH

DHANDA, a small village in tehsil Phillaur of the Jullundur district in the Punjab, has today the distinction of possessing a very progressive farmer in Sardar Basant Singh whom I met recently. Modest and shy by nature, this 65-year old farmer has leaped into fame by producing a remarkable yield of maize amounting to 120 maunds 37 seers and 4 chhataks from an acre as against an average acre-yield of 20 to 25 maunds in the area. This won him the first prize in the crop competitions held at the tehsil level in 1951-52.

A ready smile from none else than the Sardar himself greeted me as I, led by his son, approached the field where he was busy hoeing and thinning out his recently sown cotton crop. The sweltering heat of the summer sun did not seem to bother him at all. I was greatly struck by the zeal with which he seemed to apply himself to work in spite of his old age.

"I have come here to know from you the secret of your success," said I, opening the conversation, "and how you managed to obtain such a high yield of maize".

The farmer thinning his line-sown cotton. To his right is his son, who is hoeing the field.

Sardar Basant Singh

"I will tell you all about it. Let us sit on that *charpai* under shade.

"In fact, I only follow the simple rules of farming such as a good preliminary cultivation, a liberal use of manures and fertilisers, timely irrigation, use of good seed and, above all, bestowing personal attention on the crop. I believe in working with my own hands."

"You will rarely find him absent from his farm," confirmed the local agricultural official accompanying me.

"So, in raising my prize-winning maize crop", continued the Sardar, "I made it a point to conduct all the operations involved in the best possible way."

METHODS ADOPTED

Thereafter, he explained to me in detail the methods followed by him. I was told that the prize-winning

crop of maize followed the berseem crop of *rabi* 1950-51. In the second week of June, after harvesting the berseem crop, the field was given four ploughings and 35 tons of farn yard manure was applied. About the first week of July, nearly three inches of rain was received and the farmyard manure was scattered in the field in the second week of the month. The seed was sown in the third week after giving two more ploughings, the seed rate being 10 seers for an acre.

Good cobs from the maize crop previously raised on the farm were selected and kept for use as seed. The advantage of keeping the cobs in this condition was that the grains remained free from any insect attack.

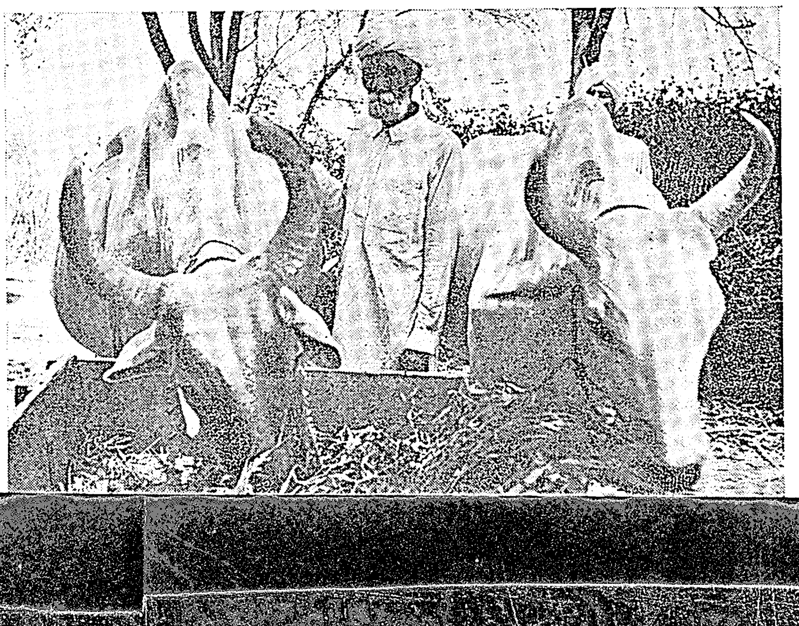
The first irrigation was given after two weeks followed by two hoeings. Some rain was received thereafter and two more hoeings were done. After this, the second irrigation was given and one hundredweight of ammonium sulphate was applied. At flowering time, one more hundredweight of ammonium sulphate was applied with the third watering and another hoeing was given. A fourth watering was given after about five days and another hundredweight of ammonium sulphate wes applied at the time of grain-formation. Three more waterings were given at intervals of five to six days after that, and the crop was harvested in the third week of November.

"It does not matter how many waterings you give, but it does matter whether the waterings are given when the crop needs them," said the Sardar. "And you will like to know that six out of the total eight waterings were given by me after the flowering stage had set in as that is the most appropriate time for irrigating the crop. Another factor that contributed towards the high yield was that the harvesting of the crop was intentionally delayed for a few days so that the grains matured fully and did not shrink afterwards. There were two to three cobs on each stalk and fortunately, nothing untoward happened to the crop".

GROWS SUGARCANE TOO

Sardar Basant Singh, however, does not specialise in growing maize only. He is an all-round progressive farmer interested in improved methods of agriculture and raises other crops such as cotton, wheat, grain and sugarcane, as well. In fact, as regards sugarcane he is considered to be one of the best farmers in the area.

After the day's work. The farmer does not neglect the feeding of the work animals that serve him so well in his farm operations.



The farmer beside his sugarcane crop. He is considered one of the best sugarcane farmers in the area.

He has been raising sugarcane for over 40 years now and has improved his yields from year to year. The maximum that he had obtained was 1,363 maunds per acre in 1951-52. The pumping set for irrigation installed on the farm with a subsidy of Rs. 2,000 out of the Cane Development Funds in 1951 and the use of the variety Co. L. 9 recommended by the Department have a great deal to do with the success of Sardar Basant Singh in raising sugarcane.

When questioned as to how he actually carried on the various operations involved in sugarcane cultivation, Sardar Basant Singh told me that first of all, five to six preliminary ploughings are given to the land to bring it to a fine tilth. The first ploughing is given with a furrow-turning plough while the subsequent ploughings are done with a *desi* plough or a Kisan hoe (Triphali, as it is known locally) at intervals of three to four days. Sowing is done in lines two feet apart, that is, in alternate furrows made with a *desi* plough by dropping the setts behind the plough.

One month before planting, that is, in February, farmyard manure at the rate of 800 maunds for an acre is applied to the field. Besides, cattle are penned in the field whenever possible to enrich the land with their droppings. One hundredweight of ammonium sulphate is applied to the crop as top-dressing in two doses—in June and July. The total dose to be applied is divided among the various plots and is placed in the water channel, to be carried to the plants by the irrigation

water. In all, about 17 to 20 irrigations are given to the crop.

"Do you grow your own seed?" was my next question. "Of course, now I am growing my own seed of the variety Co. L. 9, the seed of which was first obtained from the Agriculture Department." He also told me that for a better germination, the seed was soaked in water for 24 hours before sowing. The setts were planted in straight lines but overlapping each other, and setts having two eyes were only retained. About 35,000 to 40,000 setts were needed to plant an acre.

Before germination, one blind hoeing is given and one hoeing and weeding are done after each irrigation during the first month. Earthing up is done with the break of the monsoon and the crop is tied up in August-September to avoid lodging. Harvesting continues from the end of November to March.

When asked about the pest attacks on the sugarcane crop, I was told that it was generally subject to the depredations of the pyrilla, the top-borer and the stem-borer. While the pyrilla could be controlled by dusting BHC, a top-borer attack could be combated only by selective cutting of the affected shoots and destroying the eggs and moths after picking them with hands.

In the case of the stem-borer, the spike-thrust method was adopted. This consists in pulling out the 'dead-heart', and thrusting a pointed spike in the cavity to kill the caterpillar hiding inside.

PROFITABLE VOCATION

The average recovery percentage from the cane grown on the farm is 10 to 12 per cent, i.e. about 14 seers *gur* are obtained from three maunds of cane. After keeping enough sugarcane for home use and seed purposes, the rest is either sold to the nearby sugar factory or converted into *gur*. In any case, the cane-farmers availing themselves of the benefit of subsidy from the Cane Development Funds are bound to offer 50 per cent of the produce to the sugar factory. For *gur*-making, Sardar Basant Singh uses an improved furnace known as the "Jullundur Special".

The cost of all operations from the preparation of the land to the transporting of cane to the sugar factory, I was told, comes to about Rs. 600 per acre, whereas the income from one acre amounts to about Rs. 1,400; thus leaving a net profit of Rs. 800 per acre. "In my view, there is no better business than farming, of course, if intelligently pursued," added Sardar Basant Singh, smilingly.

Yields obtained by Sardar Basant Singh in the other crops are not ordinary either. Newly-introduced 320 F, long-stapled variety of cotton, has given him about 20 maunds per acre as against the average of eight to nine maunds in the area, and wheat, 25 to 30 maunds as against the average acre-yield of 15 to 16 maunds. The cotton seedlings in the line-sown field presented a picture of perfect uniformity and reflected the deftness with which the work had been done.

(*Continued on page 30*)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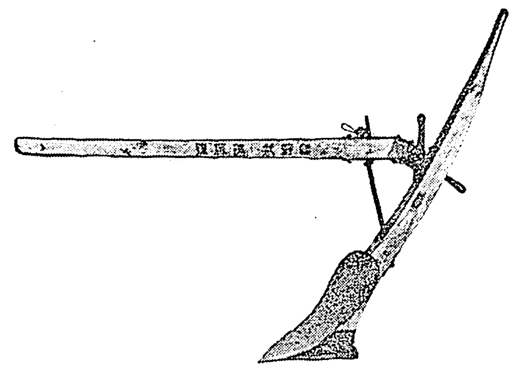
IMPLEMENTS AND MACHINES FOR RICE FARMERS



A Japanese rice land plough (drawn by a single animal)

by

R. V. Ramiah

IN the small rice fields of Japan farmers use cheap, simple and mostly manually-operated implements and machines. Most farmers, because they do not maintain cattle, rely on hand-operated implements.

With the Japanese method of rice cultivation having found favour with our farmers, many of these implements could be used for our rice lands in India too, but this will mean some slight changes in our cultural practices so that they can be worked efficiently. Some of them require minor changes because of the difference in the size and shape of the paddy grown here and in Japan.

The Indian Agricultural Research Institute has been importing some of these Japanese implements from time to time for trial here. Some observations on these will surely be of interest to our rice farmers.

THE PLOUGH

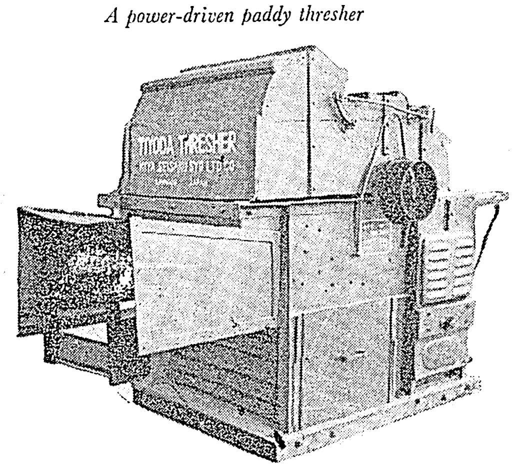
A steel plough is used in Japan for the rice fields. This plough seems to have some of the features of the country plough used by the Orissa farmer. It also has the mouldboard effect of the western plough. The hitching arrangement of the Japanese plough is different, however, from that of the Indian country plough. It has a short beam as only one animal is used for ploughing in Japan, as in some of the other Far Eastern countries. This naturally is a handicap here since our bullocks are always used to work in pairs.

The point of similarity between the Japanese plough and the Orissa country plough lies in the plough bottom. Both of them possess the suitability for working in land under water for puddling the soil.

Again, the plough used in West Bengal in the rice fields is very much similar to the Orissa plough. However, in most rice-producing states of India, the plough used for wet and dry cultivation is the same. In such states, may be, it will be worth while to try

A hand-pushed paddy drill used in Japan

A power-driven paddy thresher



The rice land plough from Japan or from Orissa.

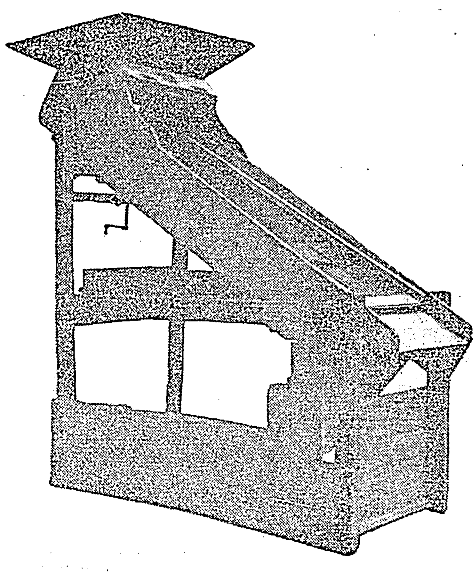
RICE LAND PUDDLER

There does not seem to be any specific implement used for puddling in the rice land in Japan. A wooden implement is being used in Burma for puddling in the rice land and also for crushing clods in the dry lands. In South India a firm is manufacturing a cast iron puddler which is being used in some of the states. Experiments are in progress on the possibility of using tractors and power implements for this purpose. A large mechanised farm in Gwalior has successfully been using a light wheel tractor for this purpose.

American scientists believe that puddling is not necessary for rice cultivation but this may be due to the very limited acreage (two million acres) under rice in the U.S.

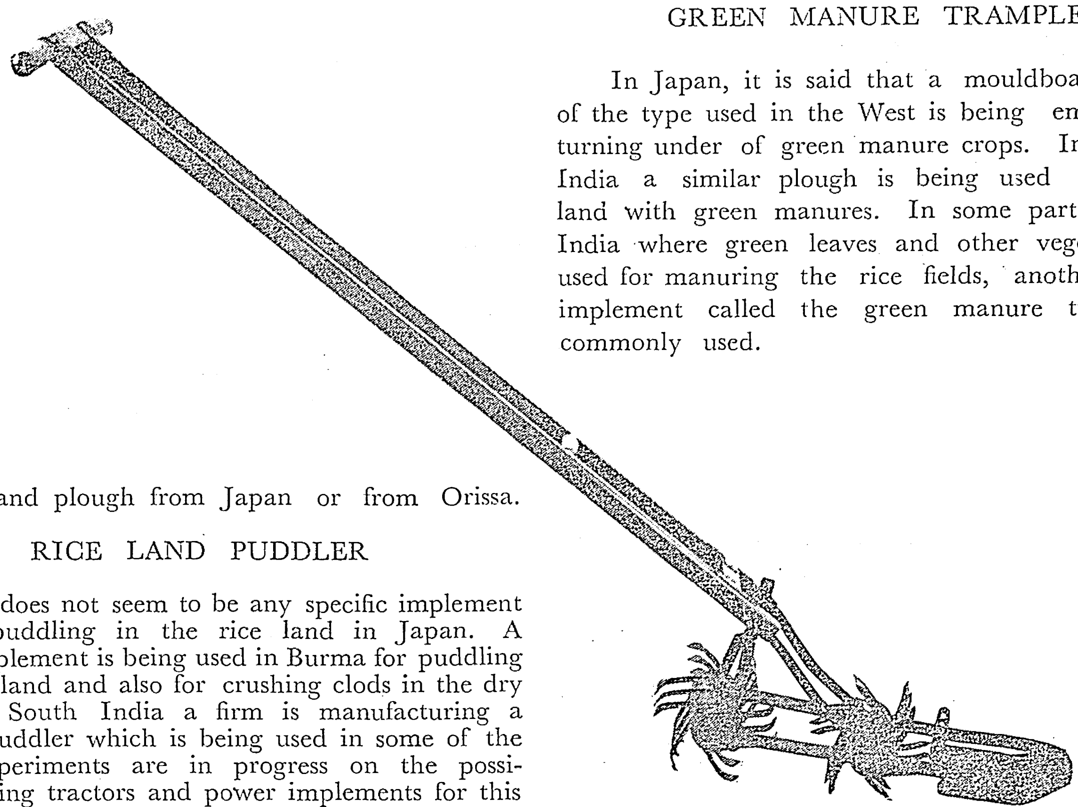
The puddler being manufactured in India is a very effective and labour-saving implement and may be tried with advantage.

A grain cleaner and grain grader



GREEN MANURE TRAMPLER

In Japan, it is said that a mouldboard plough of the type used in the West is being employed for turning under of green manure crops. In Northern India a similar plough is being used to fertilize land with green manures. In some parts of South India where green leaves and other vegetation are used for manuring the rice fields, another type of implement called the green manure trampler is commonly used.



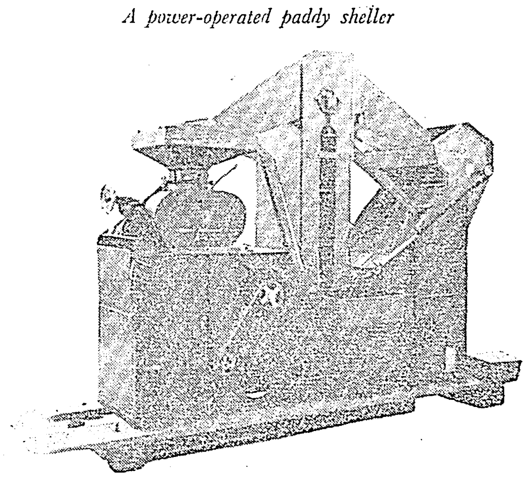
The Japanese type rice land weeder

SEED DRILL

A transplanted rice crop is known to give a higher yield than a broadcast crop. However, in Japan, seeds are sown mostly in rows. Seeding is done with a hand-operated paddy drill in fields with a little standing water and hence no furrow openers or earth-closing discs are needed. Because of the difference in the physical shape of the paddy fields in India the Japanese seed drill will need considerable modifications before it can be used under our conditions.

(*Continued on page 14*)

A power-operated paddy sheller



SPOT THE LEADER . . .

This is not a game, but only some practical hints to the village worker to help him find local leaders.

IF you are working in a village, and you are to succeed in the work you are doing, you have to solicit the full support of the real leader in the village. As village extension work is "helping people to help themselves," the recognition and useful guidance of a village leader become the foundation of good extension work. In other words, local village leaders are essential to the kind of work you are doing.

There are two kinds of village leaders. One has authority and the other has influence. Sometimes, this is the same man. Often, however, the villager who most effectively can influence the people is not recognised as a leader. People never think of him as a leader. Oddly enough, a real leader usually does not know that he has this influence.

If you know some of the qualities that make a leader, it will make your search easier. The real village leader believes in people and their desire to improve. He likes people and is liked in turn by them. He is eager to learn and willing to work. He is always willing to give credit to others for good work, and has friends among the young and old, rich and poor, in the village. He is dependable and is always willing to carefully discuss important village problems.

NAMES THAT MATTER

When you ask villagers to name somebody who will be good for a certain job, you will find them all recommending one or two names. If the job is important, the names recommended are likely to be the names of people with real influence. The best way of finding out the real leaders of the village is not asking the villagers to name them but to find them yourself by putting to the cross-sections of the villagers separately whom they would name to help you in such work as holding a demonstration or conducting a meeting. The common names given out by the various cross-sections would be more dependable.

It is important to recognise leaders who are already considered so by the villagers. If you have these leaders promise to help you, you have as good as the assurances of the villagers themselves. A demonstration put up by the leader is likely to be valued more by the villagers. On the other hand, if you get a leader in authority to do these things, you will have no good way of appraising the real effects of his leadership on the villagers.

TRAINING FOR LEADERSHIP

Once you have found the leader willing to help you in planning and organising village activities, get him to assist you in getting material for demonstrations and such other work as holding of meetings where views can be exchanged, conducting demonstrations and visiting places of demonstrations and centres of work.

In case the village has more than one natural leader willing to help you, get them both for your work. Help them develop leadership ability. Pay special attention to young people who are just beginning to grow into future village leaders.

In developing leaders, stay in the background and let them do the work as well as take the credit for the work. There are ways of showing how high you think of them and their work. Giving them publicity in newspapers, seeking their advice on important matters, allotting responsibilities to them, inviting them to accompany you on interesting visits, giving them a chance to meet interesting people who come with you to the village and visiting the demonstrations they are conducting are some of the ways which you may try. Inexpensive awards such as garlands, certificates, books and seeds may be given to them at public meetings held in appreciation of the work done by them.

Every village is a better community which has local leaders to help in village work. They are the persons who understand local situations well, have the ability to make more contacts, devote more time to work and stimulate others to follow them.

There are, however, some limitations to the use of local leaders in village work. For example sometimes a leader may give misleading information because he may be lacking in the proper training in or an intimate knowledge of certain

(*Continued on page 26*)

SOIL CONSERVATION—SOLUTION FOR BIDAR'S ILLS

Bidar, like many other places in India, is in sorry plight because of its failure to put land to proper use.

by
D.C. KAITH

MOTORING from Hyderabad to Bidar—the old city of domes—one becomes aware of the apathy the people have shown towards proper land utilization—thousands of acres of good land ruined by erosion.

None have bothered about the serious effects of soil erosion, except the local forest officials, who have been demonstrating how soil fertility could be rebuilt on the eroded uplands and the good farmlands in the valleys below saved from ruin.

Bidar in Hyderabad State is reputed to be one of the best districts, and here community projects have been carried out in a full-hearted measure and one part of the District has been constituted into a National Extension Service Block.

Yet, Bidar's sorry plight is due to its failure to put land into proper use.

Of the District's 29,31,321 acres, nine per cent is covered by scrub jungle of the open type. The so-called pastures occupy 4·5 per cent of the total, fallow lands too eroded to support vegetation occupy 7,64,253 acres or 26 per cent of the area and the cropped area occupies 17,43,651 or 59.4 per cent of the total.

This means that 31 per cent of the total available area is not being used to its full capacity, and this constitutes a potential threat to the agricultural land below.

The livestock strength of the District, comprising oxen and cows, buffaloes, sheep and goats totals 10,36,310. More than half the number are oxen and cows. Taking the total land available for grazing, a cow unit gets just ·15 acre. No animal can survive on ·15 acre of highly eroded land.

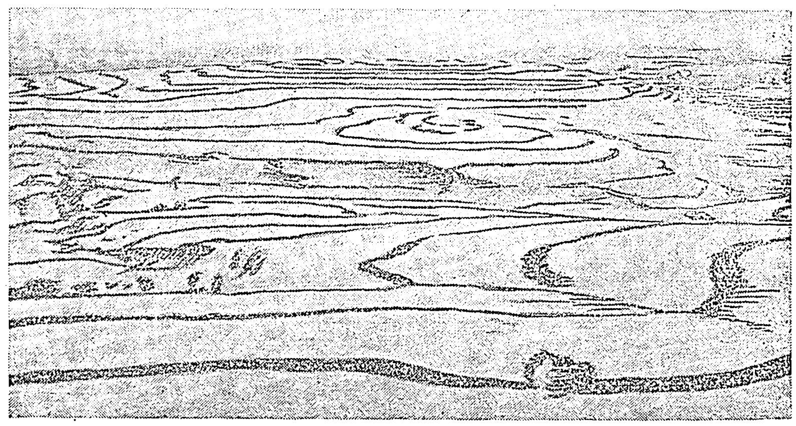
Bidar has 11,72,702 people, and taking one pound per day as the fuel requirement per person, the requirements for a year work out to 1,91,078 tons.

Most of the fuel required comes in the form of cow-dung cake, which means thousands of tons of cattle manure burnt every year, which rightfully should have gone to manure the fields.

The cause of Bidar's ills can easily be traced to reckless cutting down of trees, without effort to re-planting. With the reduction of vegetation, rainfall has been decreasing, wells have been drying up and yields have been on the decline.

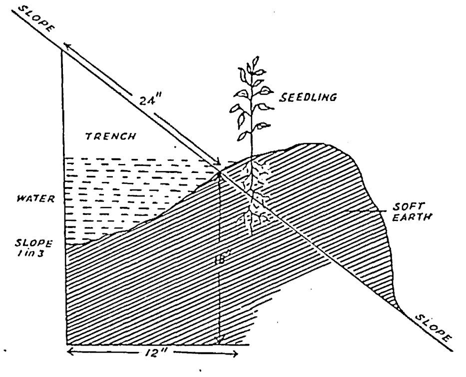
Forest officials have been fighting the evil, and have made a beginning in afforestation of the eroded lands in Bidar and other districts. Afforestation will prevent soil erosion, conserve water, create fuel and fodder reserves and protect agricultural land from further deterioration.

Bidar soils are red ferrugenous loams, changing in places to hard *murram* and *kankar* and intermixed with black soils derived from Deccan traps. The District receives an annual rainfall of 30 inches which is mostly received in the monsoon months of June to September.



A view of contour trenches dug and filled in Bihar

The Forest Department has been trying the afforestation measures in Blocks of Shahpur, Chetta and Honikery. The area which has one to three per cent slope, is trenched. The trenches dug are along the contour, are continuous, and are 2 feet wide and 1½ feet deep, and 60 feet to 150 feet apart.



These trenches are partially filled up with soil and a bund is formed on the slope side, giving a slope of one in three. Seeds are sown on the higher side of the slope. Gullies are "bunded" up by earth or stones to accumulate silt.

The trees selected for sowing are: *Melia azaderachta, Acacia arabica, Cassia Siamea, Albizzia lebbeck, Tamarindus indica, Terminalia balerica, Mangifera indica, Bombax malabaricum, Dendrocalamus strictus* (bamboo), *Tectona grandis* (teak), *Prosopis juliflora* and *Santalum album.*

Trenching, filling in the earth and bunding are finished by the end of May and the sowing carried out in June and completed by the third week. Vacancies are filled in during the early monsoon months.

Three rows of seed are sown, one in the trench, one on the bund and one in-between the two.

Though a large number of species have been tried, a few of them will ultimately succeed, and it is the intention of the officials to plant these species on a mass scale. So far, *babul*, mango, the Cassias, bamboo and *nim* have shown good results.

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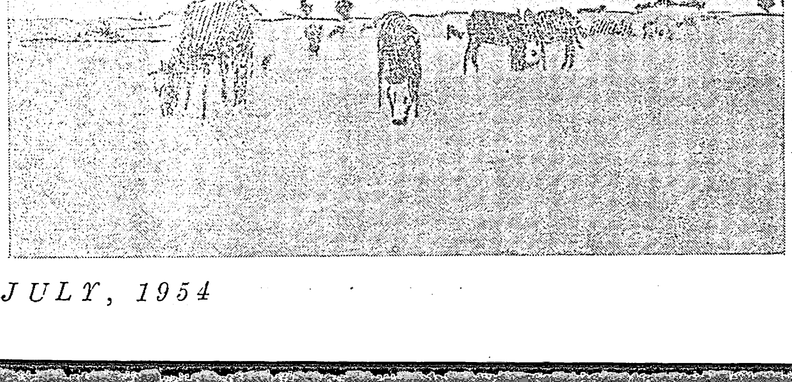
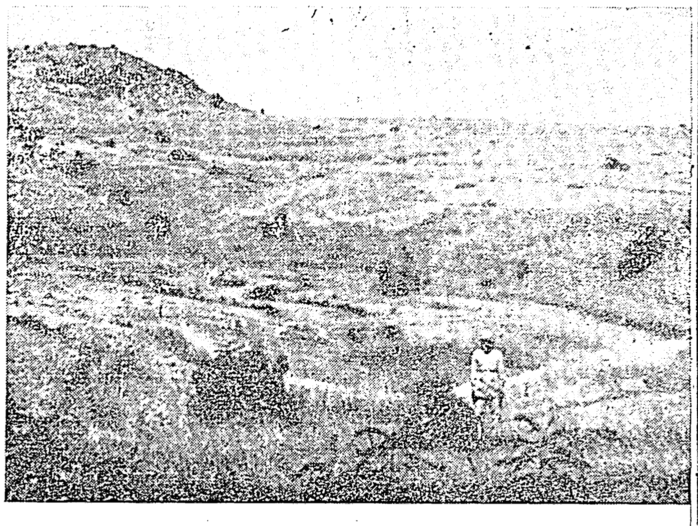
Bare eroded land where grass refuses to grow more than a few inches even in the rainy season. With cattle constantly pecking at the grass, nothing is left on this land except sheet rock.

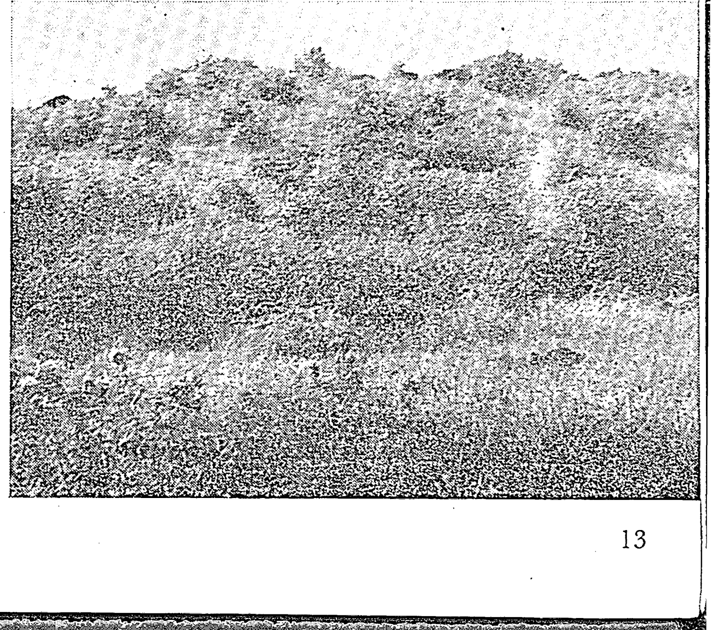


A view of the Shahpur afforestation area of 1947, in Bidar

Grass seen cut and stacked in the background of the picture. Con trenches and Cassia siamea *can be seen in the foreground as well as on slopes on the left and right.*



Bushy growth and grasses coming up naturally in portions of Bid effect of rigid fire protection and complete closure to grazing for seven ye



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RICE LAND WEEDERS

In our country, excepting for tiny hand-worked implements, no manually-operated or bullock-drawn implements are available for removing weeds from rice fields. The use of such machines, however, requires row planting. The Japanese rice land weeders are simple machines for weeding the rice crop. These manually-operated implements can be carried by one man and worked by a single person and continuously for eight hours without feeling exhausted. While effectively pulling out the weeds, they do not injure the rice crop. These weeders can usefully be employed in places where paddy is sown in rows or transplanted with 9 inches to 12 inches between rows as these implements are suitable for row widths of nine inches and above. Since the implements require atleast an inch or two inches of standing water, they cannot be worked in dry fields. In Japan when row widths are bigger, they use three or four row weeders pulled by a single animal. Two firms in India are manufacturing rice land weeders for Indian farmers.

PEDAL-DRIVEN RICE THRESHERS

Very effective though small rice threshers are being used in Japan. These machines are available in two sizes, one to be operated by a single person and the other operated by two. Both the types are pedal-operated. It is reported that with an additional attachment the threshers can be used for wheat, oats and barley also.

The threshers have a rotating cylinder on the periphery of which bent steel wires are fixed. When this cylinder rotates and the paddy ears are brought in contact with the steel wires, the grain is separated from the straw.

Agricultural Departments of most of the rice-producing states in India have tried these machines and though their opinion regarding its working is not unanimous, they have found it to be a labour-saving device. In such states where labour is cheap, however, these do not seem to be economical. Four Indian firms, at present, have started the production of the single person operated pedal type rice threshing machines, their sale price varying from Rs. 90 to Rs. 120.

POWER-DRIVEN RICE THRESHERS

Small engine or motor-driven threshing machines are also used in Japan. These are small enough to be conveniently carried on the shoulders of two men even on the narrow bunds of the rice fields. The threshers are so designed that the rice straw is not damaged in any way and can be retained straight and unbroken. This kind of straw is needed for the Japanese farmer for making mats and ropes because fibres are not available. This aspect of their design, however, is of no particular advantage in India because we do not make use of rice straw for any such purpose.

GRAIN GRADERS

In Japan, the farmers use grain graders, which do not depend upon wind for their working. The graders are used for separating weed seeds, chaff and dust from paddy grain after threshing. The grader can be hauled into the fields by two men. By using this machine the solid grains are separated from shrivelled ones and weed seeds are also collected separately. However, if these machines have to be used in India the grain screens will have to be modified to suit the size and shape of the paddy grain here.

PROCESSING PADDY

Straw and paddy are very economically made use of in Japan. For processing these, they have efficient machines of a cottage industry type. For straw three manually-operated machines are in use. They are the straw cutter, straw mat weaving machine and the straw rope-making machine. These machines are not described here as we do not make use of straw as the Japanese do. These machines, however, can be used for other fibres in India.

Three different machines are also used for processing paddy. They are the hand-operated paddy sheller, power-operated paddy sheller and the power-operated rice polisher. The paddy shellers remove the hull and do not affect the rice kernel in any way. The machines have a rubber band on the surface. This hard faced rubber can be renewed whenever needed. It is this rubber roller which is flexible that is responsible for the high turn-over obtained from the Japanese rice shellers. The rollers are adjustable for different sizes of grain. A firm in South India is manufacturing a modified type of rice sheller to suit our conditions and to give a better performance.

Rice milling machinery is produced in India since a long time which is also exported to Burma, East Africa and Shillong. This type of machinery is based on the original German design (Engleberg type) which is also in common use in the U. S. A. today, but Japanese machines are of small size, low in investment and better in performance.

The above machines were secured through the Indian Embassy in Tokyo for trial at the India Agricultural Research Institute, New Delhi. Some of these were presented by the Japanese Ministry of Agriculture and some were also sent by Messrs. Bannerjee & Co. of Japan. A catalogue of Japanese implements is also available from Messrs. Japan Advancement Association of Agricultural Machinery and Implements, Taito-ku, Tokyo. Some of the above machines are also described in the bulletin, "Agricultural Implements for Indian Farmers" issued by the Indian Council of Agricultural Research, New Delhi.

NO. 9 IS THE LUCERNE FOR YOU

by

H.C. MALIK, ECONOMIC BOTANIST (FODDER), SIRSA

AT the Fodder Research Station, Sirsa, District Hissar, variety No. 9 Lucerne has shown that it is superior to all other varieties tried, both in out-turn of green forage and recovery after cutting. The variety is finding a great favour now among Punjab farmers.

Lucerne, the Queen of forage crops, is one of the most important fodder crops of this State. It is the oldest perennial legume grown solely for green forage. Properly manured and inter-cultured, it gives a very good yield for a number of years. Seven to ten cuttings can be had in the course of the year.

It is a very good fodder for feeding livestock, especially work animals. It is a soil-improver and grows particularly well in a dry climate under irrigation. The crop, however, remains stunted during the monsoon season, as its growth gets restricted due to the intense heat and high humidity during that period. Except for this period the crop grows well and gives a continuous supply of fodder throughout the year.

Success in growing lucerne is very much associated with the variety used. No amount of good management can compensate for a weak and poor-quality variety used.

In lucerne the characters which are desirable are its high forage-yielding capacity, quick recovery after cutting, fine stem and leafiness, ability to withstand drought, good seed production and persistency of stand.

All these characters, however, are not found in any single variety, but experiments with 12 varieties of lucerne conducted at Sirsa have shown that variety No. 9 has the outstanding merits both for forage-yield and sprouting ability.

In the experiments this variety yielded 601 maunds of fodder on an average per acre in a year, the nearest to it being 346 maunds from another variety, S 10230.

When cuttings were taken at intervals of 21, 28 and 35 days, lucerne No. 9 gave per-acre yield of 453, 528 and 821 maunds respectively. This compared very well with the averages for all the varieties tried 184, 256 and 369 maunds per acre.

The experiments clearly indicate that no other variety would equal No. 9 in sprouting and ability to recover in growth after each cutting. Thus a farmer can depend upon this variety at all times of the year except during the heavy monsoon when there is ample grass to meet his needs.

Lucerne requires a well-drained, medium loamy soil. Seed is sown at the rate of four seers per acre broadcast or by drill in rows 1 foot to $1\frac{1}{2}$ feet apart on a well-prepared seed-bed. The best time of sowing is from the middle of October to the middle of November. The first irrigation is given three to four weeks after sowing and later on at intervals of one month during winter and a fortnight during summer. The crop is ready for the first cutting in February and later on at intervals of 30 to 35 days. In all 600 to 800 maunds green forage per acre in 8 to 10 cuttings is

(*Continued on page 26*)

A crop of Lucerne No. 9

FILTER POINTS PROVE FRUITFUL

by

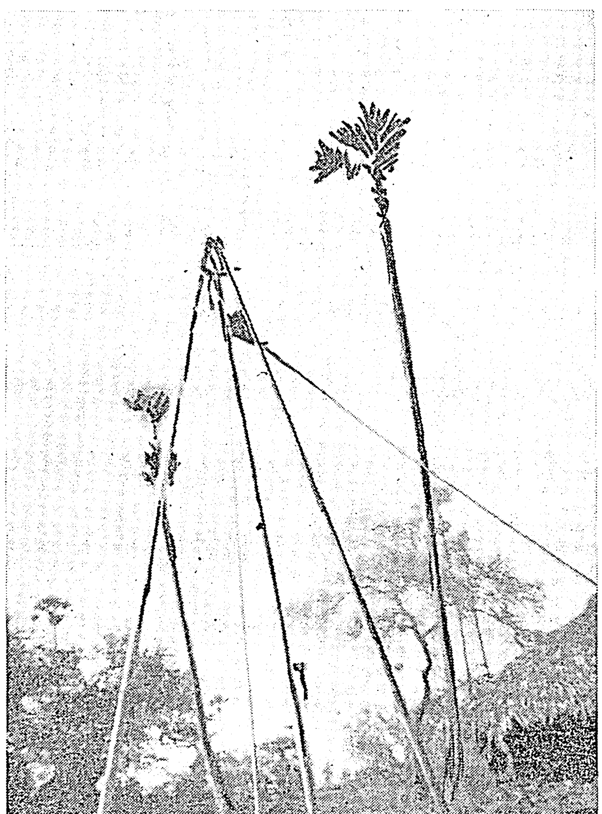
K. VEERABHADRA RAO

More and more farmers are installing filter points as a new way of getting water for a second paddy crop in the Godavary Delta

IN the Godavary Delta, the first crop of paddy is cultivated from June to October. The water from the irrigation system goes to waste from November to January, except where it is used for irrigating garden crops and green manures. This is so because no second crop of paddy can thrive during these cold months, as the wind from the easterly direction (called *thurpu gali* in Telugu) blowing at this time is very congenial for the paddy stem borer.

Efforts were made in the past to make use of this water for paddy during this period, but without success. So the second crop of paddy has to start only from about the middle of January.

Fixing up a filter point

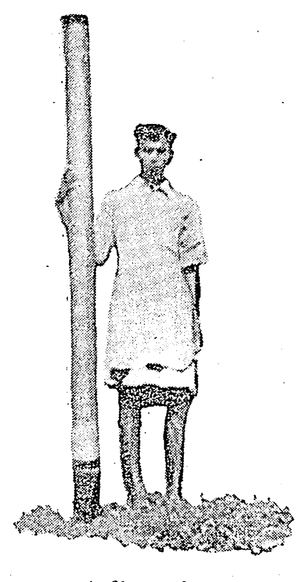


By the time the paddy cultivation starts, the flow in the river goes down, and since there is no reservoir, only a third of the Delta area gets water for the second crop. In some years, especially when the usual summer showers in March-April are not received, the second crop in this limited area also fails for want of moisture, as there are no wells or storage tanks either. Thus a very good land has to be kept waste for want of irrigation facilities.

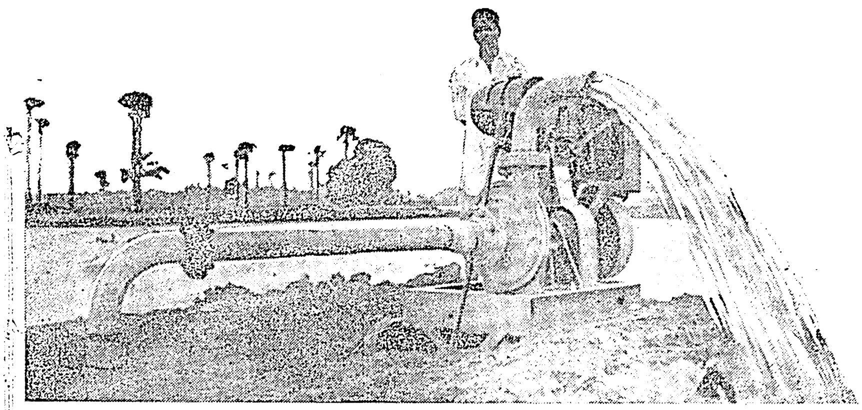
In 1952-53, when I was the District Agricultural Officer in East Godavary, I made an effort to try filter points as a source of irrigation in the summer months. The villages of Yeditha, Someswaram, Tapeswaram and Chelluru of Ramachandrapuram Taluk of East Godavary district were selected for experimenting with these filter points. In these villages, the water table is very high, being only 10 to 15 feet even during the hottest months. The water is sweet and the yield is considerable.

The first 10 to 15 feet of the soil here is alluvial clay. At a depth of 10 to 15 feet, coarse sand is met with. This sandy stratum is fully saturated with water which can easily be sucked through the filter points. This fine soil profile is brought about by the transported nature of the soils at the mouth of the great river Godavary. All this area is fully covered by water for over six months in the year by canal irrigation. It is only from November to May that the area is dry on the surface. These are ideal conditions for the working of the filter points.

The filter point consists of a triangular cast iron tip to which a cast iron or G.I. pipe is welded. Numerous round holes of $\frac{3}{4}$ inch diameter are drilled in the pipe. There are 700 to 800 holes in a 3 inches $\times$ 6 feet filter point. The pipe is then covered with a fine brass wire gauze which is reinforced by another covering of brass sheet mesh.



A filter point



Irrigating with a filter point

The filter points are simple to make and local village smiths were trained to manufacture them. At first three American "Wellworth" points were purchased. These were dissected and blacksmiths were asked to imitate them. Later on, filter points of various sizes, 3 inches × 6 feet; 4 inches × 6 feet; 5 inches × 7 feet and 6 inches × 8 feet, etc. were made locally. The triangular cast iron tips also were cast in a small foundry. In this way local talent was trained to manufacture the necessary equipment.

The fixing of the filter point is very simple. In the beginning, no special equipment was used for the purpose, and a wooden or an iron weight, like an old roller of a country sugarcane mill, was placed on the top and it was hammered down by two village blacksmiths. As this went down, necessary pipe lengths were fixed. The check valve was put in at the top of the water level.

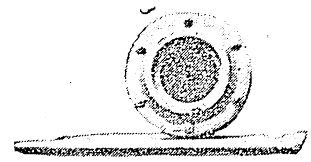
Later it was thought that it would be more convenient to fix the filter point above the ground level. So, after it was driven to say, 20 or 30 feet, it was tested for yield by a centrifugal pump worked by an oil engine.

The depth to which the filter point is to be driven can be judged from the water table in the draw wells nearby. Discharges ranging from 6,000 gallons to 24,000 gallons, depending on the size of the filter point and underground conditions, were recorded.

There were some failures, mainly due to the sucking in of fine sand and consequent blocking up. Wherever fine sand is met with filter points are a failure. All efforts to counteract this difficulty proved useless after a short period and for this reason, filter points cannot be recommended for places where fine sand is met with in the lower strata.

With experience, however, it was possible to make several improvements. Now, instead of beating it down, a casing pipe is first driven in, using an earth auger to the required depth and the filter point is then put in the bore so made. The casing pipe is removed and the gap filled up with sand. A sand shell is utilised as soon as the sandy layer is reached in the bore.

This way, over 150 filter points were successfully installed in about a dozen villages. Each commanded a minimum area of 10 acres of the second crop of paddy. The maximum was 23 acres. Thus about 2,000 acres were irrigated during the season for the second crop of paddy which produced 30 maunds of paddy per acre. An increased production of 60,000 maunds of extra



The cast iron tip of the filter point

paddy could thus be got by the method during the very first year of its introduction. Besides this there are several advantages like the possibility of starting paddy nurseries for the first crop early and irrigating the garden crops, green manures and vegetables.

More and more farmers are taking to these filter points. This area is now included in the Community Project and they are taking advantage of this successful experiment. This would now enable them to grow a crop in summer. The demand for electric energy for pumping is also on the increase.

The cost of a filter point equipment will be as follows:

	Rs.
Filter Point 4 inches × 6 feet	90
Check valve 4 inches	20
G.I. Pipe line 4 inches × 20 feet at Rs. 5 per foot	100
Other fittings	50
Labour	20
Cost of oil engine and pump set (5 BHP engine & 4 inches pump)	1,700
Contingencies	20
	2,000

(*Continued on page 21*)

A successful filter point in the Godavary Delta

THE SCIENCE THAT WENT BEHIND THE TUNGABHADRA PROJECT

by
W. THIRUMULA RAO, ASSISTANT CHEMIST, ANAKAPALLE

THE four districts of Bellary, Anantapur, Kurnool and Cuddapah in the Deccan zone of the composite Madras State are famous for their constant recurring famines. These districts, because of their situation, feel the influence of the South-West and the North-East monsoons but to a small extent and since both the total and the distribution of rainfall influence crop growth and yields, this area suffers very badly as a result.

In these districts, the farmer is very ingenious and it is here that the system of farming known as "dry-farming" has been perfected. The farmer, to whose credit are the evolving of famous implements like the "gorru", "guntaka" and the "dantulu", has developed the art of farming to such an extent that with the single pair of animals he is able to cultivate as many as 30 to 40 acres.

IMPORTANT FACTOR

But the economic condition of the people is poor and the tract has the lowest density of population in the State because of frequent famines. But, however, during the not very common occasions when rainfall has been in time and sufficient, the farmers have reaped bumper yields, which only points to the fact that water is the one factor that can bring prosperity to the 1,600 square miles of farmland of this area.

The river Tungabhadra, skirting the districts of Bellary and Kurnool was, therefore, thought of as the natural water source that could change the face of the entire area. This river has a perennial flow and a flood surplus that can be stored. The river has its source in the Mysore State in an area of heavy rainfall and extensive catchment.

Before considering any project for the harnessing of this river for bringing the waters to this area, however, the suitability of the black soils predominating in the area had to be considered, and this cautioned the need for pre-irrigation and post-irrigation soil surveys. As such the Agricultural Department took up, towards the end of November, 1934, a soil survey to determine the suitability of the soils for irrigation.

SOIL SURVEY

The soil survey, extending to the entire area of 1,600 square miles, was for studying the various types of soils in the area, finding out the structure and texture of these soils at different levels so that their permeability and drainage could be known, estimating the occurrence of the soluble salt content, studying the effects of irrigation on the different soil types to know the kind of irrigation that would be most suitable for each of them and finding out possible measures that could be undertaken in case of any harmful effects when brought under irrigation.

The detailed examination undertaken into all these aspects both in the field and the laboratory lasted for more than a year. Side-by-side, a detailed agricultural enquiry was also conducted at representative centres, and information on crop rotations, tillage practices and manuring systems in vogue was collected.

The soil survey showed that 80 per cent of the soils were black with high lime status and good base exchange capacity, while the rest were composed of red soils—deep, shallow and mixed. The presence of gypsum indicated the existence of a high zone of salt concentration, mostly occurring at a depth of three feet. Permeability in clay soils is low, but the gypsum present improves permeability and percolation. Harmful salts of the carbonate type were absent in the soil. Soluble salts in irrigation water play a very important part in effecting soil characteristics. So far, however, the Tungabhadra water has not produced any harmful changes in the black soils though instances have occurred of water from other sources producing unfavourable soil change, leading to formation of sodium clay.

PROTECTIVE IRRIGATION

All possible evidence, therefore, pointed out to all success in irrigating black soils. The Government, therefore, recommended that proper drainage be provided as an adjunct to the distribution of the water to areas and that the drainage channels so aligned that the drainage water may not find its way into the supply channels. It also recommended a light irrigation of dry crops as a sort of protective irrigation as this would obviate indiscriminate use of water and benefit a greater area.

As a forerunner to the inauguration of the Project, research to find out solutions to agronomic problems in field practices was also undertaken and a research station opened at Siruguppa in 1937. Here, a study of physico-

chemical reactions of the typical black soils, both deep and shallow and of gypseous and non-gypseous nature was undertaken. At the Research Station, studies on duty of water, rotation of crops, soil management, types of crops suitable for cultivation, and introduction of new crops were undertaken. Seven years of intensive work at the Station confirmed the earlier findings that the area was suitable for irrigated farming.

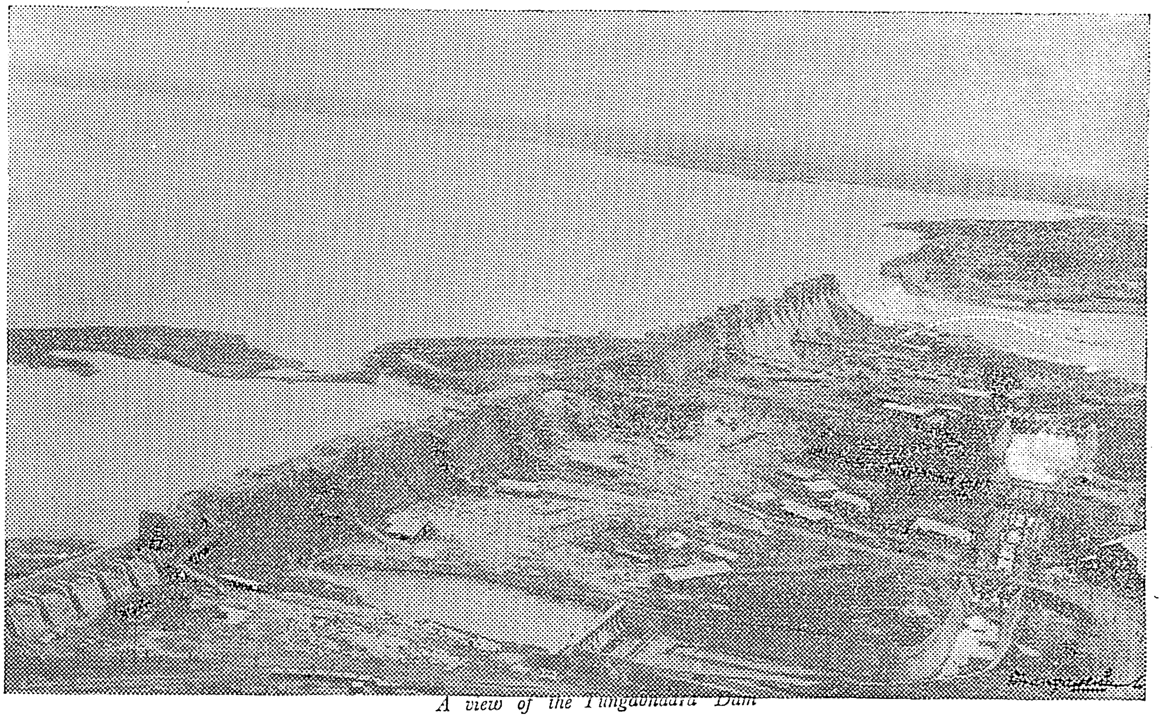
All scientific evidence thus assuring success for the Project, the Tungabhadra Project was started in February, 1945. The construction of the dam is just completed and the digging of different canals is being finalised. The dam is 6,007 feet long and 160 feet high and is built at Mallapuram, a few miles up the river Tungabhadra near Hospet. The Project consists of the low level canal and the high level canal stages and is a combined power and irrigation scheme. The low level canal, just completed, has begun to irrigate the farmlands.

PROJECT COMPLETED

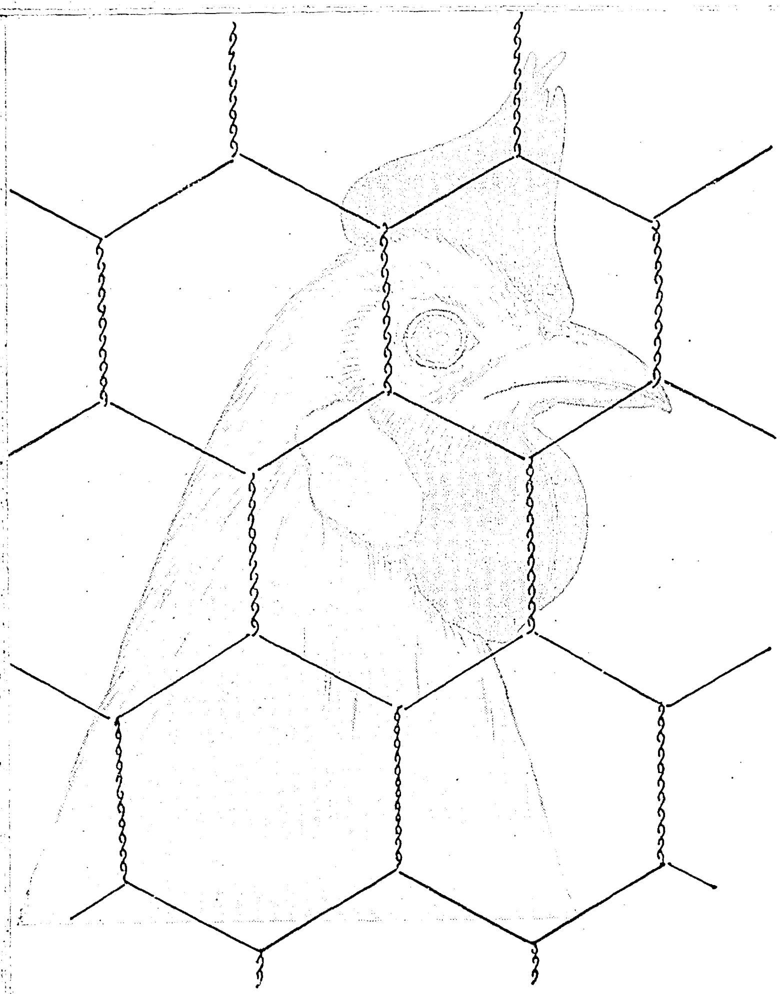
The main low level canal is about 200 miles in length and runs on a ridge from the places where the dam is built in Bellary district to Kurnool district. The water is shared by Andhra, Mysore and Hyderabad States. The Project is intended for protective irrigation and can be termed "dry irrigation", being used for raising the dry crops usually grown in the tract. The amount of water is restricted to a total of eight irrigations of two inches each and given at fortnightly intervals. Only one crop, either in *mungari* (early season) or the *hingari* (late season) can be raised in the dry-cum-wet zone. When this low level system is developed it will irrigate 2,50,000 acres on the Madras side, comprising a perennial zone of 15,000 acres of wet land crops like paddy and sugarcane, a wet zone of 43,000 acres for raising a single crop of paddy and a dry-cum wet zone of 1,92,000 acres where only one dry crop can be grown. Adequate provision can be made for irrigations when rains fail.

Of the total area, half is to be put under food crops and the other half under cotton and groundnut.

The Tungabhadra Project has brought a new hope to the farmlands so far accustomed to the vagaries of nature. The Project is such as to facilitate still further expansion. It is quite possible that some day in the near future a still larger area is brought under assured water supply. The Project is surely a case that gladdens the hearts of the band of workers who took up this pioneer type of detailed scientific investigation which led to the transformation of the famine-zone into a veritable granary for the people.



A view of the Tungabhadra Dam



FOR YOUR POULTRY FARM

START WITH A PLANNED LAY-OUT

by

S. G. Iyer

IT is a very wise policy to have a proper plan regarding the scale of operations that you wish to build up in the poultry farm you are intending to start. It is always best to start off in a modest way and build up solely from the stock you yourself finally are able to select. However, it is necessary to have a definite idea of the eventual lay-out so that the farm can be properly designed and conveniently worked. I have seen the lay-out on many farms and have found that these farms grew up haphazardly, involving unnecessarily large capital investment and extra labour charges.

Having decided on the breeds you want to maintain, the next question to decide is with what you will start your basic stock. Personally, I would advise starting with hatching eggs as this is probably the cheapest method and incidentally the safest. The beginner should start off with the best possible stock, and if possible, see the parent stock. Ensuring that the vendor is dependable is also important.

In buying eggs for hatching, see that they are good-sized, clean and good-shelled and fresh. This can be judged by the size of the air cell and the appearance of the yolk. Make sure that the eggs are not more than seven days old.

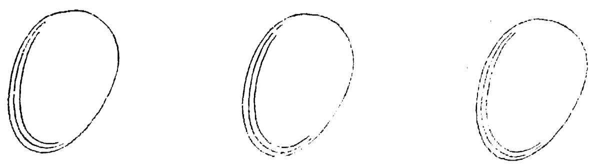
If you are thinking of starting with grown-up birds, it will be best to buy those which have been trap-nested for a year with males who come from females having good records. If possible, see some of the eggs produced by the female.

You can also make a start with pullets but this may turn out to be, as often happens, an expensive way of starting a farm.

If stock is to be purchased, it is better to do so from a nearby source because birds easily pick up diseases if they have to travel over long distances. The journey itself may make the birds go into moulting. If birds are obtained from different sources, keep each lot isolated for ten days so that you can detect the appearance of any disease in any group and localise the same. Feed on the sparing side till the birds get used to their new feeds.

If the farm is going to be primarily a breeding farm, the most expensive part will be putting up fences to keep the different stocks apart. As a general rule, the pen should be, as far as possible, a square as such a shape provides the maximum of space per unit of fencing. Runs should be six feet high.

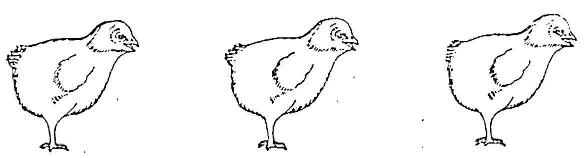
The incubator room and the brooder house for the birds should be close to your dwelling house as these are the places you will have to visit quite frequently.



Provide 20 square yards of space for an adult bird and atleast 10 square yards for a young bird. The brooder house should be drought proof, airy and able to provide protection from wild animals and birds. Normally, if there is no danger from predatory animals, it should be possible to get the chickens out from the brooder house when they are quite young, but usually because of the danger from such a source, the chickens are put out only after they are eight weeks of age.

The beginner is well advised to aim always at quality than number. Hence, defective birds should be killed or sold off for table at the earliest opportunity. Similarly, deformed chickens or ailing birds should be eliminated.

One common mistake poultry-farmers usually commit is the overcrowding of birds. This has to be avoided. At the beginning of the season it is advisable to work out a hatching programme which will give enough time to clean out each brooder compartment before it is stocked again. The hatching programme should not be such as to entail overcrowding in any class of stock.



The number of chickens that can be put in a brooder depends on the size of the brooder and the compartment. Roughly, a square foot of the area can accommodate 20 to 25 chickens.

As far as possible, make it a point to purchase atleast a new male of each breed every year to replace the old one. Though this bird will give a number of males in the next season, it is always good to bring in a fresh male breed for the following season.

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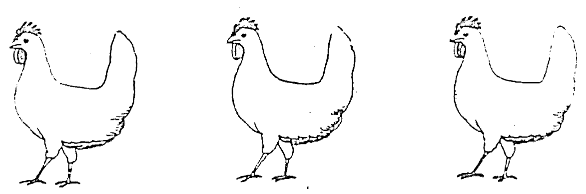

(*Continued from page 17*)

If electric energy is available, the cost will be only Rs. 1,700 because of the difference in cost between a 5 BHP oil engine and 7.5 BHP electric motor.

The cost of irrigation is the cheapest when water supply is available from any project. It is only the cost of water cess, which usually ranges from Rs. 12 to 20 per acre in the Godavari Delta. The cost of lift irrigation by a filter point tube-well or from a well or pond is the same. The cost of working the engine and the depreciation have to be taken in working out the cost. The above equipment on an average can command 10 acres of the second crop of paddy. The cost of depreciation can be safely taken as 10 per cent. Therefore, the cost of irrigating an acre by a filter point tube well is roughly as follows:

	Rs.
Cost of fuel oil for four months (working at eight hours per day)	400
Cost of lubricating oil	30
Small repairs and maintenance	20
Driver boy at Rs. 40 a month	160
Depreciation at 10 per cent	200
Contingencies	40
Total for four months	850

Since this cost is for 10 acres, irrigating an acre for four months will work out to Rs. 85.

Usually, this outfit can manage 12 to 15 acres, and last for over 15 years. Thus the cost will work out still lower taking this into consideration. Even with this heavy cost accounting, it is certainly a paying proposition, with the additional advantages of perfectly easy fixing and working. Filter points will obviate the costly, laborious and uncertain process of well-sinking.

THIS WAY TO MANAGE YOUR GOAT FLOCKS

by

H. K. LAL

GOAT-breeding has to be done on systematic lines if the flock-owner has to get the best benefits from the animals he maintains. It must be remembered that good feeding and housing alone will not bring about improvements in the flock unless attention is paid to proper breeding.

One good, strong and pure male, three or more years old, can serve from 50 to 150 females a year, provided he is always maintained in a healthy condition. Though a buck is capable of service at eight to nine months, he should not be allowed to mate till he is 15 to 18 months old nor should he serve more than about 30 females a year before he is three 3 years old because he would not be fully matured till then. When the buck is quite young, it is good to allow an interval of about two weeks between services. Later the interval can be reduced to two or three days.

CARE OF THE MALE

The male should always be kept separate from the females. This will prevent his becoming unduly restive or excited and will enable him to serve a larger number of females during the year. When a female comes into heat, she should be brought to the male and removed after she has been served once or twice.

If the buck is well kept and properly looked after, he may be useful for breeding for as long as even 12 years.

Proper grooming, where possible, is necessary to maintain the animals in good health. Clipping superfluous hair every three months in the bucks keeps them clean.

Kids take just about five months to be born after the female has been mated, and as such it may be possible to breed her as often as twice a year and though she may come into heat a month or two after she has given birth, it is not advisable to mate her again at that time as it would mean an unn cessary strain on her. Precautions should be taken to prevent her from being run down.

SEPARATE STALL

A female goat should be kept in a separate stall or compartment for about a week before the time she is "due", to avoid the danger of her being injured by other goats. When signs of approaching parturition are noticed, she should not be taken out to graze but kept in a comfortable goat-pen. She should be kept in the special compartment for about three to four days after kidding, after which she may be allowed to go out for grazing with others. At the time of kidding, the goat is best left to herself, as she rarely requires any assistance. Newly born kids on gaining their legs, make for the mother's teats. If they do not succeed in doing so or are slow at it, it is of no consequence, as kids do not require nourishment for a number of hours after birth.

MILK FOR THE KIDS

If two, three or more kids are born, it may be necessary to see that the smallest one gets sufficient milk as generally the stronger ones do not give it a chance to the teats fully.

In case the udder is too full with milk, the weight and pressure of the same will cause pain to the

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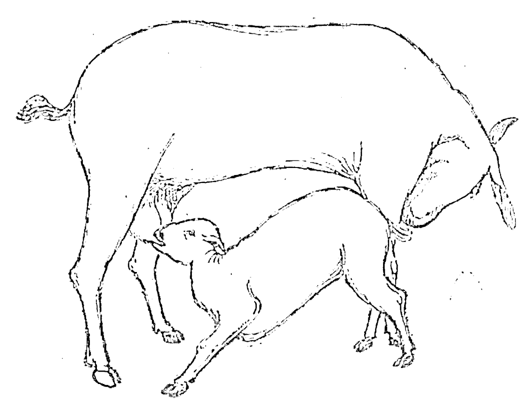


THE WHEN AND HOW OF WEANING THE CHILD

The question that young mothers mostly ask

MOST young expectant mothers are interested to know some details regarding the nursing of the baby. The question they ask is how does nature's method of feeding the child compare with artificial or bottle feeding? How long should a mother with sufficient of milk nurse her infant ?

Today, we have a lot of scientific informtion to help us. We know a good deal about what milk contains and what sanitary principles to follow so far as milk is concerned. In the days of our grandmothers, all this was unknown and the infant's survival depended a great deal on whether or not he was nursed on mother's milk.

NO DIGESTIVE TROUBLES

The very small, premature baby or the infant who has a poor digestion does better on its mother's milk than artificial feeding because the mother's milk is nature's most perfect food for the baby. Even for the strong and sturdy baby who has had his full term shows greater freedom from minor digestive troubles on the mother's milk than when bottle-fed.

Apart from this, nursing a baby makes it feel warm, cozy and loved and it finds this form of getting nourishment very pleasant.

Instances occur, however, when the mother's milk is found unsuitable for feeding either because it is too rich and heavy or too watery or poor in quality. Then, of course, the necessity for a formula preparation arises.

In bottle feeding, the mother should always make it a point to hold the infant in her arms so that it may feel a sense of closeness and security. Bottle feeding has disadvantages too but this need not unduly worry the mother.

A gradual breaking of baby's habit from mother's milk to that of bottle milk so that eventually it gets all its feed from the bottle is called weaning.

Weaning is resorted to when the mother is extremely ill or her milk does not agree with the baby. It is also done when the mother cannot produce enough of milk or does not like the thought of nursing her baby. In many of these cases, weaning may have to be done rather fast so that baby and mother do not suffer in any way. Then the doctor is best consulted.

STRAIN ON MOTHER

No definite answer can be given to the question how long should a baby be nursed. Probably, eight to nine months is good, provided there is enough milk. It is not uncommon for poor working mothers to nurse their children till they are even two years old. Probably, this is because the mothers cannot afford to buy milk for them. However, this is a great strain on the mother and soon tells upon her health.

If conditions are normal, weaning must be done gradually so as not to upset and irritate the baby. It is good that the baby gets accustomed to a bottle a day from the early months so that at six or seven months it may take the bottle with ease.

The baby's satisfaction after each feeding and his rate of weight-gaining generally indicate the time to start weaning. The mother will also know when her milk supply gets diminished so that she may start weaning the child.

The best way to start weaning, according to medical opinion, is by omitting one breast feeding at a time and allowing two or three days to pass before omitting another. The breast feedings that are omitted should be reasonably spaced. This will help the mother to get used to the lessened demand on her milk.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

LET NOT PESTS BOTHER YOUR VEGETABLES

Telling you how best to tackle the destructive little things in your garden

Cockchafers, beetles, borers, aphids, bugs, ants and termites—this is the big list of pests that thrive on a vegetable plot, consuming, of course, a good part of the farmer's income.

Farmers are familiar with the kind of damage they do—to the roots, foliage, buds, flowers and even fruits.

No one control measure can save the crop from all these pests, because the measures have to depend upon the nature of the pest and its mode of feeding. Some can be killed by spraying with stomach poisons, some have to be sprayed with contact poisons, and yet others require fumigation to exterminate them.

COCKCHAFER

The cockchafer is a voracious eater of the roots, foliage and flowers of tender vegetable plants. The grub cockchafer has a large bloated body and ultimately transforms into a beetle, brownish in colour.

The insects are active at night feeding on leaves, flowers and even fruits of vegetable plants and can be caught with the help of light traps. Such traps can be set up by placing a kerosene oil or gas lamp in the middle of a trough filled with water. A little kerosene oil is poured over the surface of the water. The trap is placed in the middle of the field. More than one trap may be necessary for large fields. The insects, attracted by the light fall into the kerosene-mixed water below, and are killed.

In case the attack is too heavy, a spraying of lead arsenate affords a sure remedy.

BEETLES

The beetles attacking the vegetable crops are the red pumpkin beetle, the black pumpkin beetle, epilachna beetle, which damage brinjals and cucurbits and the rhinoceros beetle which bores into the slender stems, leaves and other portions of the plants.

Light traps and lead arsenate may be used to control beetles. Some of them can also be killed by filling the holes bored by them with *neem* oil.

BORERS

Caterpillar borers can be killed by punching them with a piece of wire or filling the holes bored by them with *neem* oil. Beetle borers may be exterminated by plugging the holes bored by them with cotton wool dipped in a mixture of two parts of chloroform to one part of creosote, and sealing the mouth of the hole with beeswax.

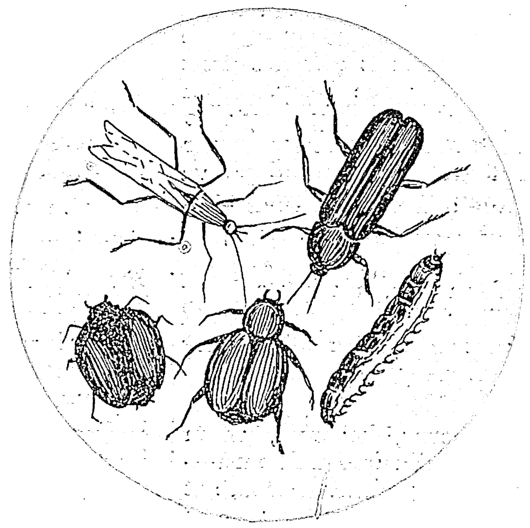
APHIDS OR PLANT LICE

These are small soft-bodied insects, usually green, deep purple or black in colour and are commonly seen in colonies on peas, cabbage, radish, etc. They attack tender parts of the plants like the shoots, tender foliage, buds, flowers, etc., and suck the sap which hampers growth of the plants culminating in the complete drying up of the affected part or the whole plant.

Tobacco decoction, fish oil rosin soap and sometimes even a mere soap solution in water are used to get rid of plant lice.

MEALY OR WOOLY BUGS

These too collect on the plants in compact colonies depositing on them egg-masses of cotton-like fluffy



material. Repeated applications of an oil insecticide such as fish oil rosin soap may be necessary to control them.

ANTS

These not only encourage infestations by insects such as bugs, scales and aphids, but also are a nuisance by themselves. They bite and injure tender stems of the plants and seedlings in the nursery beds. To repel them from the seed-beds, the beds should be freely watered with a solution of four ounces of kerosene oil to four gallons of warm tobacco decoction.

WHITE ANTS

These are one of the most dreadful pests of garden crops. A good quantity of sand put all round the plant stems helps keep them off for some time. White ants can also be kept at a distance from the plants by smearing the basal portion of the plants which is in contact with the soil, with lime sulphur solution. Fumigation of ant hills with sulphur and arsenic fumes also kills the insects.

INSECTICIDES

Insecticides are usually classified under three heads: (a) stomach poisons, (b) contact poisons and (c) gaseous poisons.

Stomach poisons are used for destroying the insects like beetles, grasshoppers, grubs, caterpillars, leaf-rollers, etc., which chew and tear off bits from the plants.

Sucking insects such as bugs, aphids, etc., cannot be killed by spraying stomach poisons on the plants as the poison is not taken in by them. So, contact poisons, which block the respiratory pores of the insects, suffocating them to death, or which bring them death by causing irritation to their body are used.

Some sucking insects have a hard covering on their bodies. So, contact poisons are not of much use in their case. Gaseous poisons like hydrocynic acid gas are used to destroy them by fumigation in a closed atmosphere, usually a small tent-like structure. This method, however, is too dangerous to be employed in private gardens. Soil fumigants are now-a-days used to destroy white ants, wire-worms and eel-worms in the soil. Some of the well-tried insecticides are described below:

Lead arsenate : Lead arsenate is a safe, effective stomach poison, used against chewing insects such as beetles and caterpillars. Two pounds of the powder thoroughly mixed with 100 gallons of water would be suited for normal conditions. Its efficacy may be increased by adding molasses and lime at the rate of three pounds of lime and six pounds of molasses for every pound of the mixture.

Fish oil rosin soap : It is a ready-made dark brown semi-solid substance which is dissolved in cold water before use. The usual proportion is one pound of soap to eight gallons of water. This solution is sprayed to control the sucking insects like lice, mealy and wooly bugs, etc. Repeated sprayings may be necessary in some cases.

Soap solution : A solution of one pound of any bar soap in six gallons of water acts as a cheap contact poison.

Tobacco decoction : Tobacco and its products are some of the best known insecticides. There are several nicotine preparations such as nicotinic acid and nicotine sulphate which are available in the market, but the following can be prepared easily: boil a pound of tobacco leaves in a gallon of water for about half an hour or steep in cold water for a day or two. In this decoction dissolve about four ounces of any bar soap. When cool, dilute up to five to six times with water and use for spraying the infected plants.

Besides the above preparations, several proprietary products like 'Gammexane' and some brands of D.D.T. available in the market can also be used with good results.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay 7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

—*Editor*

(Continued from page 22)

female. A portion of it, therefore, should be drawn away. As soon as the milk comes out freely, the kid should be put to the mother. If they are unable to draw the milk properly, the teats should be placed in their mouths. Once they have drawn in a few drops, they rapidly take to the teats and will not require help the second time.

COLOSTRUM IS GOOD

The milk that comes out of the udder for the first three days has a yellow appearance. Such milk is called colostrum. This must be fed to the kids because it acts as a laxative and confirms immunity against diseases from which goats usually suffer.

When kids are about two weeks old they begin taking interest in nibbling green or dry fodder and it is good to see that they easily get small quantities of these.

Kids should get the maximum opportunity to be in the open air and sunlight. In the hot weather it will be well to put them inside an enclosure round a tree. Here they will have the benefit of shade, light and air. The enclosure should be big enough to provide for sufficient space for them to have plenty of exercise.

When kids are about 2½ to 3 months old, milk may be dispensed with and when four months old, they should be in a position to eat the solid food the older kids eat.

CASTRATE THE KIDS

Male kids should be castrated at the age of 2½ and 3 months, unless required for breeding. Incidentally, castration also improves the quality of meat. If they are not castrated, male and female kids should not be allowed to graze together. In selecting animals for breeding, not only the health but also the ancestry of the individuals should be considered because on the latter depends the yielding capacity of the progeny. The value of the male is judged by comparing the yield of the progeny with that of the female with which it is mated. As such a flock-owner must maintain correct milk records by which he will be in a position to assess the individual worth of his breeding stock.

(Continued from page 11)

aspects of village work or it may be that he is reluctant to allow others to share his duties. There is always a likelihood in the villages of some people getting jealous of the personal attention given to the local leaders. The extension worker has to guard against this.

It is likely that in some villages the people get themselves divided into opposing sections because of the conflicting opinions or differences their respective leaders may have against each other. The village worker has to be careful in dealing with such leaders and will have to use all his tactics to see that he does not get himself involved in these differences.

—*From the forthcoming publication, "Extension Guide for the Village Worker"*

(Continued from page 15)

obtained and this is maintained by adequate manuring and hoeing.

Seed is best raised during the spring season. The crop is allowed to grow and flower after taking a cutting of green fodder in January-February. To encourage profuse flowering, water is sparingly applied and withheld altogether at the time of ripening. Usually two to three maunds of seed per acre is expected but under favourable conditions as high a yield as eight maunds per acre has been obtained at Sirsa.

Small Millets
FOR
The Mysore Farmer

by

B. Venkoba Rao, Economic Botanist to Government of Mysore

As a result of research carried out for a period of eight years, new high-yielding strains of the smaller millets are available now for sowing to Mysore farmers.

Though the small millets, *same* (*Panicum miliare* lam), *baragu* (*Panicum miliaccum* Linn) and *oodalu* (*Echinochloa frumantacea* Link) occupy a relatively small area in the State, and are of local importance in the central, northern and eastern areas of Mysore and particularly in the areas bordering the States of Madras and Bombay, because of their quick-maturing habit, they assume greater importance in seasons of distress when sowing rains are delayed or fail altogether.

The work of evolving superior, high-yielding and drought-resistant strains was undertaken by the State Department of Agriculture under a scheme sponsored by the Indian Council of Agricultural Research in 1944.

Small quantities of the new high-yielding strains are being made available now for trial in farmers' fields. The following are the details of the new-bred strains :

SAME STRAINS

Two distinct types of *same* (*sawa*) are grown in Mysore. One is a short, early type, known as *same* and the other is a taller, vigorous late type, called *hejjave*. Of the early type, 35 local races were tried, and *Same* 1, a local race from Sira, proved to be the heaviest yielder, giving 300 to 500 lb. per acre of grain, depending upon the season. On an average, this has produced 12 per cent more grain than the local varieties. *Same* 2, a race from Belur was a close second. Both these have proved to be superior to varieties obtained from outside. Two high-yielding races of *hejjave*, *Hejjave* 1 and *Hejjave* 2 have been isolated. These local races give about 240 to 250 lb. per acre of grain and also turn out adequate quantities of fodder. Exotic varieties tried were found equal to local in yield of grain but suffered from the handicap of a smaller grain-size. In trials conducted so far, these have on an average produced an increase of 23 per cent more grain over the local standard.

BARAGU VARIETIES

Local races of *baragu* (*vari*) under trial amounted to 25, apart from six improved varieties obtained from outside. Among the exotics, No. 82 of Coimbatore was found to be the best, and nearly on a par with *Baragu* 2. *Baragu* 1 isolated from local *madhugiri* is white-seeded, yields on an average 225 lb. per acre which represents an increase of 25 per cent over the local. The Chintamani type *Baragu* 2 is black-seeded, more hardy and drought-resistant than the former with an average yield of 215 lb. per acre.

Oodalu (*banti*) occupies an insignificant area in the State from where only two races could be obtained. These were compared with 12 other varieties from outside. The local races proved to be definitely poor in these trials. Poona 97 proved to be the best with an average yield of 273 lb. per acre. This variety also produces appreciable quantities of forage. A local selection named *Oodalu* 2, while slightly lower in yield than Poona 97, was observed to be more drought-resistant.

While further work on these small millets is being continued as a part of the Departmental work, the above improved strains are being popularised.

TWO CATCH CROPS FOR MADHYA BHARAT

by S. M. Wakankar

Two pulse strains recently evolved have been found highly suitable for growing during the *kharif* season in fields normally sown with *rabi* grains in Madhya Bharat. They are *mung* Krishna-11 and *urid* Ujjain-4. The two strains were evolved under a co-ordinated pulse improvement scheme jointly financed by the Indian Council of Agricultural Research and the Madhya Bharat Government.

The growing of these two strains of leguminous catch crops will not only help in enriching the soil, but also increase the output of protein-rich food which our country is in very much need of. The introduction of these two crops will not encroach upon the area of *rabi* cereals, particularly wheat.

Mung Krishna-11 is an early-maturing strain of *mung* (*Phaseolus aureus*) selected from material obtained from Madras State. The crop is not, however, uniform in maturity. The first picking is ready within 65 days of sowing as compared to 110 days required by the local varieties to mature. It is suitable for double cropping in fields where wheat is normally grown.

The crop should be sown with the rains in the beginning of July. By the middle of September the pods can be gathered when they mature and later the crop can be ploughed in as a green manure. If the full benefit of the harvest is desired, a second picking is necessary.

When the green manure crop of *mung* has completely decomposed, the field should be prepared in the normal way for sowing wheat in the last week of October or latest by the middle of November.

Early urid — *Ujjain 4*

Early mung—*Krishna 11*

The *mung* crop is ideal for lands where irrigated wheat is grown but it is necessary that the lands are well-drained. The normal operations and manuring for wheat should be done when a normal wheat yield can be obtained. Phosphatic manuring of the fields can be done to advantage before sowing the *mung* crop. This crop can also be utilised as green forage if required. The normal seed-rate for *mung* is 10 pounds per acre when grown for seed and 40 pounds when grown solely for green manuring, but this seed-rate can be reduced considerably. The seeds of *mung* Krishna-11 are fairly bold. Other details are as follows:

Colour of seed	Light green
Number of grains per chhatak	1,675
Protein content	24.6 per cent
Average yield	250 pounds per acre
Percentage increase over local	12 per cent

Mung Krishna-11 is suitable for growing in the districts of Bhind, Gird and Morena in Northern Madhya Bharat.

URID UJJAIN-4

This strain of *urid* (*Phaseolus mungo*) has been evolved for the Malwa tract of Southern Madhya Bharat. It is an early-maturing strain which takes 90 days to mature as compared to 120 days taken by the local varieties. The crop ripens uniformly. It is suitable for sowing on lands where wheat is normally grown. In case the season is normal and normal rains are obtained in the month of September, a second crop of *barani* (unirrigated) wheat can safely be taken from the field on which *urid* Ujjain-4 had been grown. Similarly, normal yields of gram can also be obtained.

This *urid* strain is sown with the rains in the beginning of July and the crop is ready for harvest by the last week of September or the first week of October. After the harvest, the field should be harrowed across twice by *bakkhar* (blade harrow) and wheat or gram can be sown in the second or the third week of October. The seed-rate for *urid* is 10 pounds per acre. Seeds of *urid* Ujjain-4 are bold. Other details of this strain are given below :

Colour of seed	Dull black
Number of grains per chhatak	1,310
Protein content	23.1 per cent
Average yield	400 pounds per acre
Percentage increase over local	40 per cent

With the help of these two strains of pulses two crops can be grown where one grew before.

(Continued from page 13)

Wherever afforestation measures have been undertaken, there has been a bumper crop of grass, which is harvested and stored for use in the lean months. Cattle in such areas will naturally be better in condition as they will have better and more fodder.

The cure for soil erosion is the restoration of vegetation so as to protect the soil from the erosive action of wind and water. This can be secured by the afforestation of the high lands and the proper and sustained management of State and village forests by limitation of flocks to a number the vegetation can actually support. These have to be supplemented by taking recourse to stall-feeding and proper pasture management.

Better agricultural practices along with terracing, levelling and contour bunding will prevent loss of top soil by sheet erosion and conserve rain water.

Soil conservation is the crying need of today on the eroded lands so plentiful in Hyderabad State and other parts of the Deccan. Poor land means poor farmers, poor trade, poor Government.

(Continued from page 21)

A good alternative would be to purchase some good eggs each year, and when the pullets hatching out of these are grown-up, trap-nest them and mate them to a male from your own stock in the second year. This ensures that the females breeds the right number and size of eggs and that the male is a selected one because it comes from your own stock. Buying all your old replacement stock each year is expensive and is not a proper way of running your farm because then the stock you purchase will be of an unknown value.

(Continued from page 6)

I was not a little surprised when I was told that the present farm comprising more than 30 acres was the result of Sardar Basant Singh's own efforts. He had inherited only five to six acres of land from his father and by making economic use of the income obtained from these acres, ploughing it back into the farm, had increased the size of the farm to what it is today. People around the village hold the Sardar in great esteem and depend on him for advice in better methods of cultivation.

WHAT'S NEW IN FARMING

RICE AND AMMONIUM SULPHATE

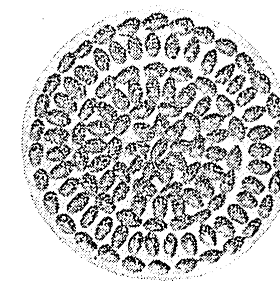
EXPERIMENTS carried out to determine how the yield of paddy can be increased by the application of nitrogenous fertilizers in the Punjab showed that the yield of paddy increased with increase in the dose of nitrogen given in the form of ammonium sulphate. However, it was found that the increase was not proportionate beyond a dose of 40 lb. of nitrogen per acre. Doses higher than 40 lb. of nitrogen per acre were found not economical. The experiments were carried out with two varieties of rice, 349 *Jhona* and 370 *Basmati*.

MONSOON FALLOWS

Farmers sometime believe that keeping land fallow during the monsoon improves the fertility of the soil. While this may be true to a certain extent, it is equally true that in heavy rains a lot of good soil is washed away if the land is kept fallow. It is, therefore, desirable that the land is cropped during the monsoon in such a manner that the soil improves. In Uttar Pradesh, where a large area is kept fallow during the monsoon, quick-maturing legumes like *Moong* T. 1. and *Lobia* T. 1. have opened out new possibilities. Such crops not only cover the land during the monsoon but being leguminous crops also add nitrogen to the soil. Again, they also yield a certain amount of grain which the farmer badly needs at that time. Other leguminous crops that can similarly be used are *sanai*, *dhaincha* and *jowar*.

HARROWING WHEAT AND BARLEY

It has been found in Uttar Pradesh that a light harrowing of wheat and barley fields after the first irrigation when the crop is not more than eight inches high has given very encouraging results. Yields, as a result, increased by about 10 per cent. Harrowing done with a light peg-tooth harrow after irrigation, depending on the nature of the soil, not only helps to aerate the soil better and preserve moisture in the soil for a long time because of the fine mulch produced on the surface of the soil, but also encourages tillering. It is estimated that if farmers were to adopt this practice in Uttar Pradesh alone, which grows about 6½ million acres of wheat and barley under irrigation annually, the State will have two lakh tons more of these cereals. The harrow used for this purpose consists of a wooden frame with iron pegs six inches long and can be made by the village carpenter and blacksmith at a nominal cost.



N.P. 809, the new variety evolved

RUST — RESISTANT WHEAT

Recently, a new variety of wheat, resistant to all the three types of rusts, viz. black, brown and yellow, and loose-smut diseases has been evolved at the Indian Agricultural Research Institute, New Delhi. Christened N.P. 809, this new variety is adapted to a wide range of agronomic and climatic conditions prevailing in the low and high elevation areas of the Uttar Pradesh and Himachal Pradesh hills.

N.P. 809 is a tall, stiff-strawed, late-ripening, beardless variety of hill wheat and is sown from early October to the middle of November. It requires an average to rich soil for its cultivation. The yield is high and the grains white, medium-sized and of good quality with an attractive appearance.

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ALL-OUT EFFORT NEEDED. In spite of this progress, an all-out effort is needed during the remaining two years to achieve the target we set for ourselves. To pay for this effort India still needs about thirteen hundred crores of rupees.

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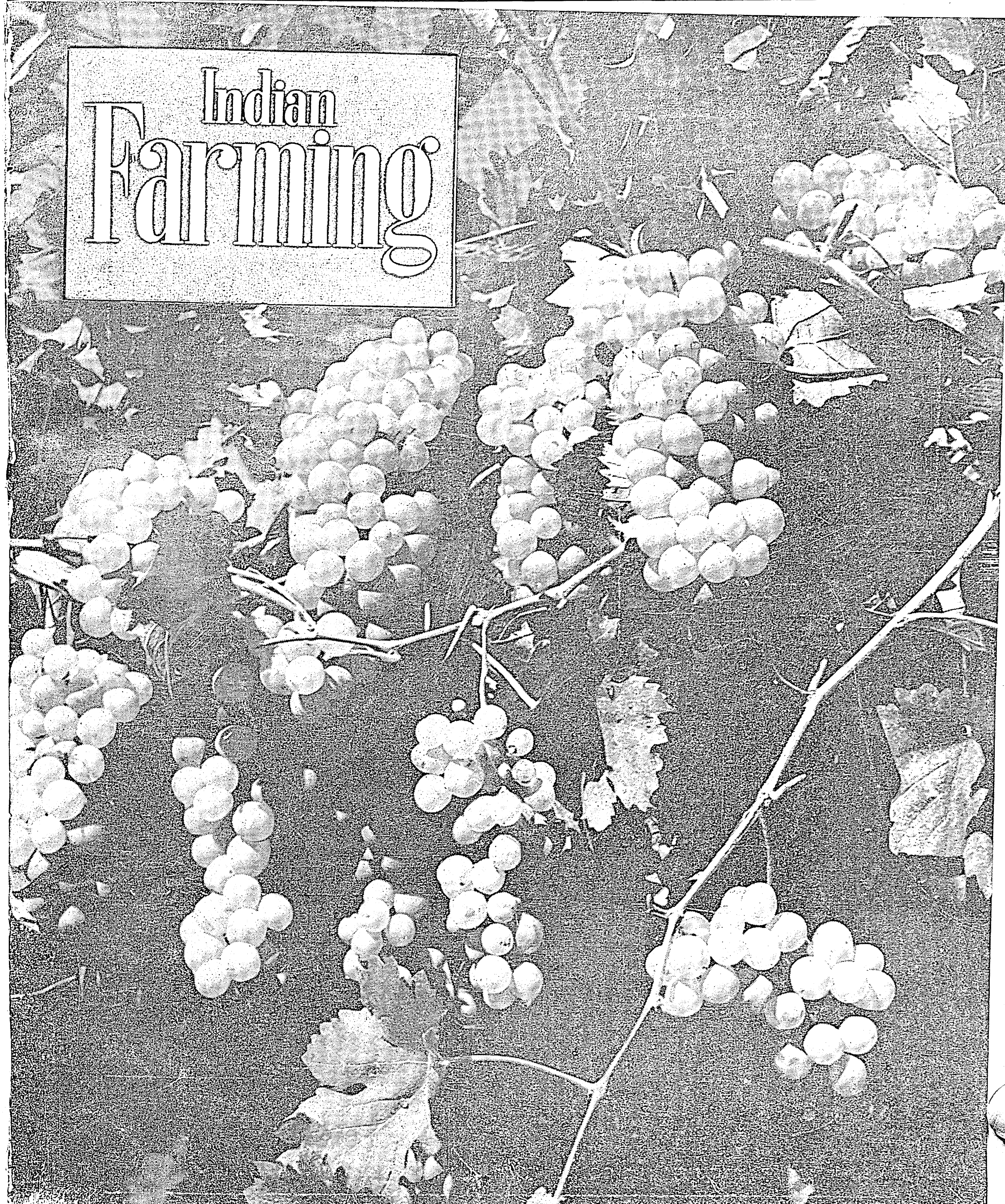
PROGRESS OF THE PLAN

	TARGETS for the Plan Period 1951-56	ACHIEVEMENTS upto 1953-54
FOOD	76·0 lakh tons (Additional production per year).	60—70 lakh tons
IRRIGATION (through major projects)	8,533,000 acres	3,556,000 acres
POWER	10,87,000 kwts.	7,24,000 kwts.
NEW ROADS	870 miles	447 miles
COTTON PIECE-GOODS	982 m. yards (Additional production per year).	1,163 m. yards
COMMUNITY PROJECTS AND RURAL EXTN. SCHEME	1,20,000 (villages)	48,750 (villages)
NEW SCHOOLS	49,695	29,723
NEW HOSPITALS	996	609

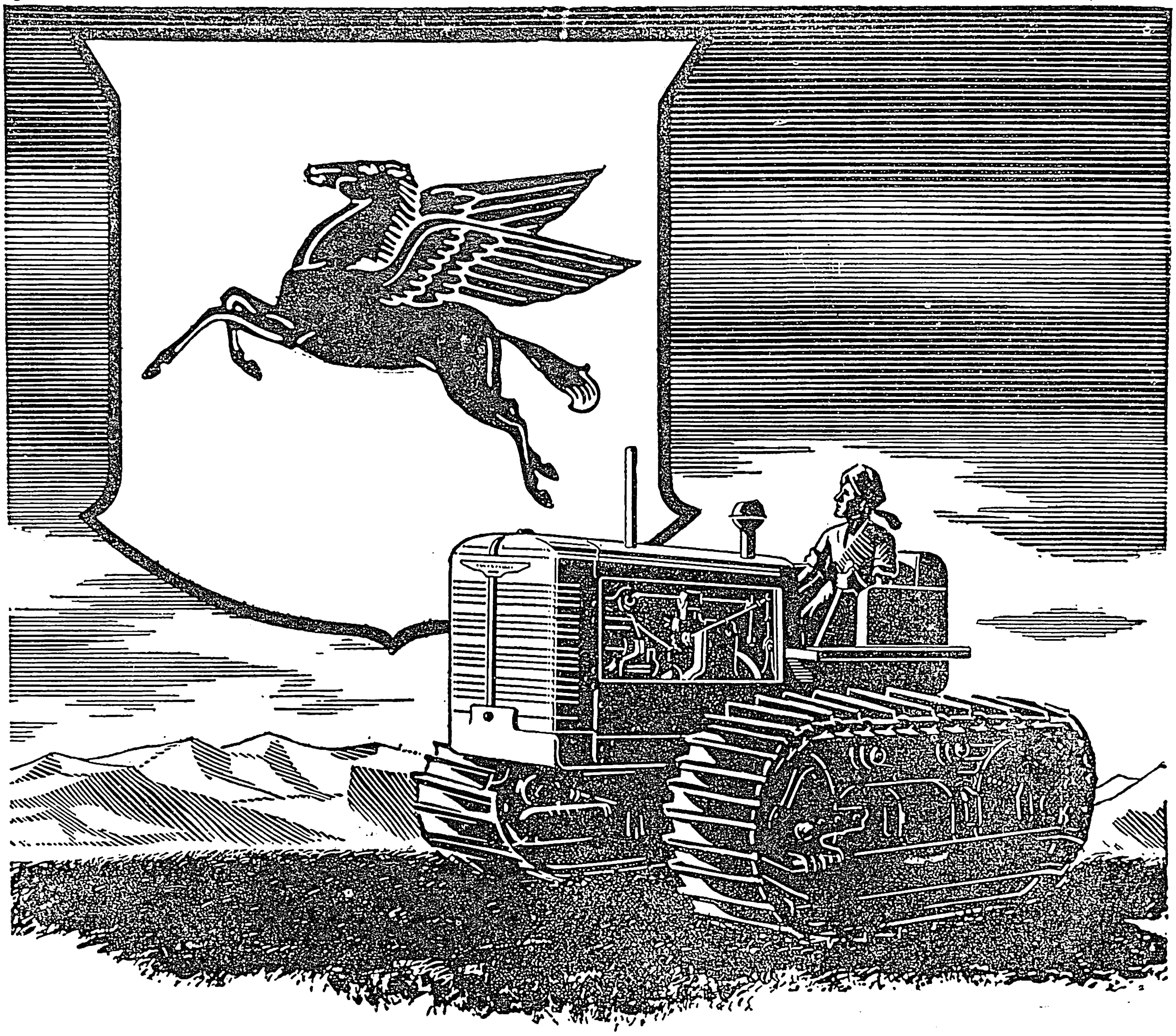
AC-566.

INVEST IN INDIA'S FUTURE

Indian Farming



AUGUST 1954



Indian Farming

VOL. IV AUGUST 1954 No. 5

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EDITORIAL BOARD

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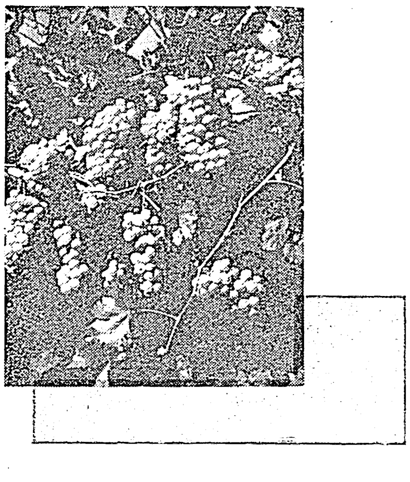
Annas 12 per copy   Rs. 9 for 12 issues   Rs. 4-8 for 6 issues

ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

FARMERS' ORGANISATIONS

THERE are no two opinions regarding the fact that any plan designed to increase agricultural production cannot succeed without an active co-operation from the man behind the plough. Governmental activity in this regard, however efficient it may be, cannot yield the desired results unless farmers fully associate themselves with the formulation as well as the execution of the plans. So far, the farmer has always strayed into the background for various reasons and has depended on others to speak on his behalf. In this process, the farmer has never received full opportunities to express his own views on matters that vitally concern him nor has he been able to take an effective part in shaping the future of the farm and the community. The National Development Plan has given the much needed incentive to the farmer to come forward to help himself as well as be helped. The meeting of representative farmers in Srinagar last month marks another chapter in the country's attempts to put the farmer on his own. How much important the formation of an organisation is to the farmers was expressed by Dr. Panjabrao Deshmukh, Union Minister for Agriculture, when he told them, "In every vocation, people having common problems and aspirations have their own organisations or councils through which they speak with one voice and, therefore, with considerable force, on questions concerning their welfare. Because of their strength and influence they command, they are in a position to secure many of their demands. That the farmer should not have learnt from these only proves the utterly helpless condition in which he finds himself today and this is so in spite of the fact that agriculture is the major industry in the country." Such an organisation, he said, could work with a common desire to provide a greater security to farming and ensuring a greater prosperity to farmers. What functions such an organisation should do has been left to the farmers themselves to discuss and decide. A bare outline of what can be done has been indicated at the Conference. Farmers have many vital problems for which they have not been able to find adequate answers. The fixation of prices of agricultural produce, the establishment of efficient marketing machinery, development of farmers' co-operatives and provision of adequate rural finance are some of the problems that have been suggested for the farmers' organisations to think about. The idea of establishing a farmers' bank to provide working capital for financing the various activities of the farmers has also been suggested. Farmers' organisations, when established at various levels, can, apart from tackling these broader issues, effectively function by undertaking a critical review of methods of cultivation practised by their members, take steps to encourage the attainment of a higher standard of efficiency in farming, promote a healthy spirit of competition and a higher standard of living. Through these organisations, the producer can have a forum in which agricultural opinion can be crystallised and forged into a well-written pattern of agricultural industry. Other issues that have been looming large in the rural horizon in recent years such as fuller employment, better wages and living conditions in the rural areas can also be efficiently tackled. It is hoped that soon there will be not only one organisation of farmers but a network of them in the country as are found in many parts of the world, working for the common good of all and safeguarding the interest of farmers for the ultimate benefit of the country.

OUR COVER



These beautiful grapes were grown by Shri G. G. Shembhekar, a farmer of Baramati in Poona district of Bombay State. The farmer not only grew grapes successfully in an area considered generally unsuitable for the crop, but also has been getting bumper yields since about 30 years.

HE MUST HAVE ONLY THE BEST

WHETHER he practises medicine or does farming, Sardar Amrik Singh, whom I met about two months ago, must have only the best. A qualified L.S.M.F. doctor, Sardar Amrik Singh took to farming about three years ago after resigning his lucrative post of doctor-incharge of a Government hospital, and is now raising bumper crops at Paddi Jagir, his native village in tehsil Phillaur of Jullundur district in the Punjab.

In fact, he is considered to be one of the best sugarcane growers of this tract. He produced the highest acre-yield of 1,504 maunds as against the average of 652.85 maunds in the area in 1953-54. On my asking him, he told me that he had used 20 maunds of groundnut cake in addition to 500 maunds of farmyard manure per acre to raise such a huge crop. He had also applied three maunds of ammonium sulphate to his field in two doses, with the second and fourth irrigations.

Dr. Amrik Singh is also a very successful wheat grower. He won the third prize of Rs. 50 in the crop competitions held at the tehsil level in 1952-53. The yield obtained by him was 51 md. 15 sr. per acre, the average of the area being 15 maunds only. Besides, he also grows improved varieties of cotton, rice, garlic, etc.

The one thing that struck me was the novel method in which he controls the pest-attacks on his sugarcane and cotton crops. He has reared 30 guinea fowls which, he told me, are very economical as compared to the labour hired for picking the insects like *toka* of cotton and the top-shoot borer or *safed keeri* of sugarcane. These "unpaid" workers of the Doctor engage themselves in this work from dawn to dusk, and no supervision is needed.

As we stood near the field watching the fowls, I was amused to see one of them jump many feet high in the air to catch a hopper; and it did not miss the mark.

It is always interesting to meet farmers like Dr. Amrik Singh who adopt novel methods to tackle their difficulties.

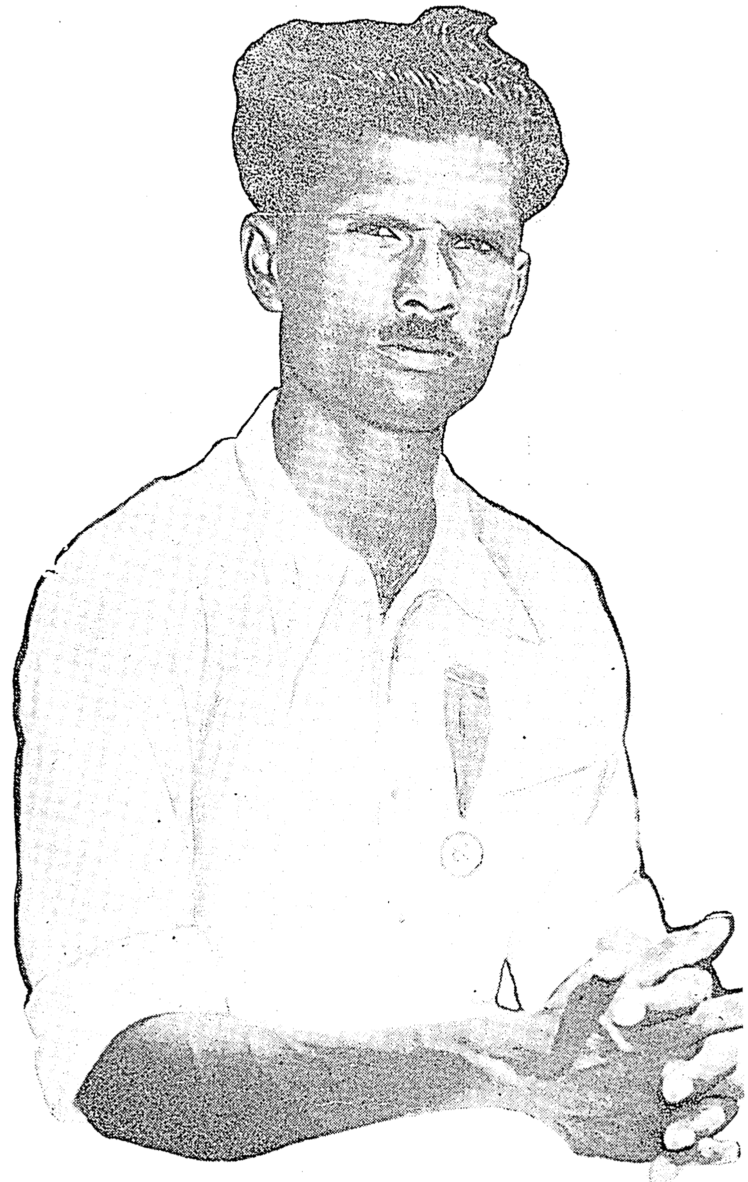
—H. K. S.

Man of the Month

Farmer's experiment leads to top yield

by

M. A. HAMID



Shri Sankaranarayana Thevar

The crop that brought Thevar fame

PARAIKULAM, a hamlet with 40 houses and 200 people, has achieved sudden fame. That fame was earned for it by its 32-year old inhabitant, Sankaranarayana Thevar, who is a new kind of hero. Thevar won prize after prize for the highest crop yields, first in the Firka and Taluk competitions of 1951-52 and later in 1952-53 in the district, regional and State competitions. The State of Madras has since given him the title "Uzhawa Manikkam" or gem among farmers. He has already produced on the soil of Paraikulam as much as 11,255 lb. of paddy per acre, and is at present making every endeavour to better that yield.

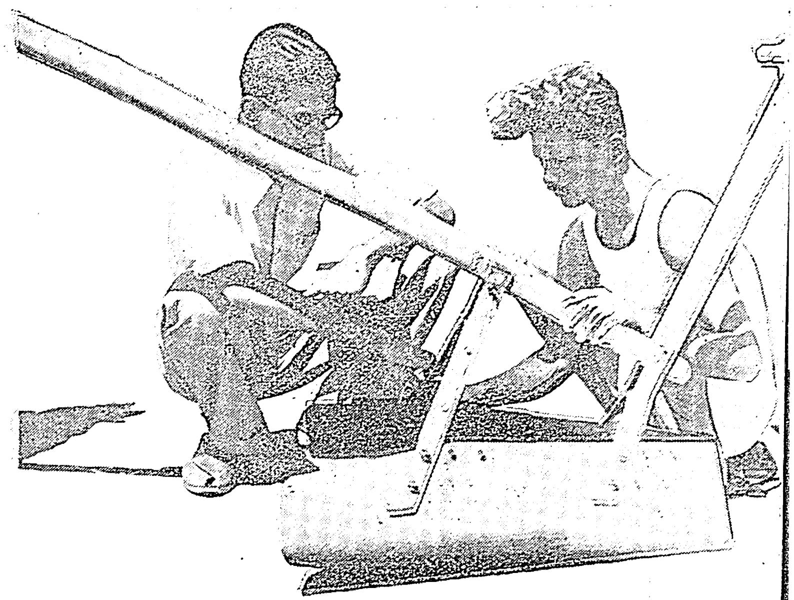
Any one who has gone to Paraikulam, that remote little village in Ramnad district, would realise that nothing but perseverance could lead to such results in that spot of earth. The hamlet has a tell-tale name;

Paraikulam, in Tamil, means the rocky tank, and true enough, in recent years the tanks in the vicinity have contained all rock and no water. One could easily notice in the scene the effect of the long drought, particularly the absence of trees and other vegetation as far as the eye could see; and in the hamlet itself one could see only a few cattle and fewer poultry. Aridity had all but devastated the region and rains came in sufficient quantity only this year.

Thevar had struggled through many such lean years with courage. Typical scion of a community well-known for its dogged perseverance, this peasant had utilised the years of struggle as years of experimenting and learning. With just seven acres of wet land to grow paddy on and without any modern equipment or adequate cattle or cash for purchasing such resources, and above all gambling on the whim of the weather God, Thevar braved through all this adversity and evolved a technique of cultivation which made him famous when the hour came.

Then he showed that he could produce nearly seven times the normal yield, that is, 11,255 lb. as against the normal 1,700 lb. per acre. And still he is persevering towards better results.

Nor is this his only achievement, for he has created in the neighbourhood (in the whole Aruppukottai Taluk of Ramnad district to which his village belongs) a commendable spirit of emulation; there is now a distinct Stackanovite spirit in the air; the local peasants are giving their sturdy individualism a new and better shape. They are vying with one another in trying to raise a high paddy yield per acre and to qualify for any or all of the official awards; and, as a result, old village jealousies and rivalries are being transmuted into healthy competition. Thevar is doing everything in his power to foster this spirit; he gives free advice to the many who seek it from him.



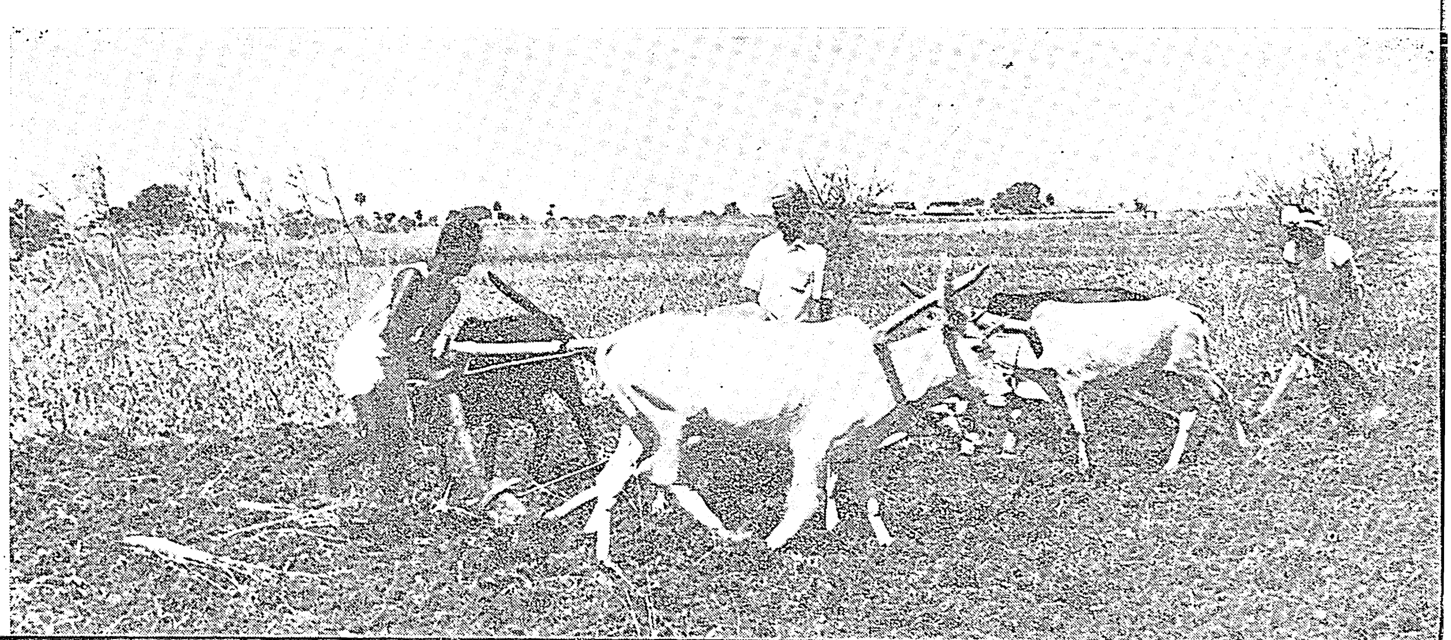
Looking at the new bund former. The farmer is keen on trying better implements on the farm

A SCIENTIFIC FARMER

If a man who has been able to grow two grains of corn where only one had been growing may be called a scientist, Thevar is certainly a scientific farmer. Conservative by temperament, Thevar derives his knowledge, uncanny as it looks, entirely from his own incessant observation; he is not, however, a sceptic in modern methods of cultivation. In fact, he displays a zeal in experimenting new ideas.

Basically, Thevar's interest in the soil is not that of a mere scientist, for it is almost paternal. "Feed the soil well and wisely," says Thevar, "and the crops will take care of themselves." He believes that organic manures like green leaves, compost and cakes of *neem* and groundnut must form the first

Thevar at the plough. He pays good attention to the preparing of the soil before the crop is planted



line of fertilizers, to which chemical fertilizers could be added in due proportion varying with the soils.

Recounting his own experience with the plot which brought him the prize, he tells his visitors how it all started immediately after the previous harvest. He brought a pen of 1,000 sheep to fertilize that 0.82 acre plot. Four months later he gave the field a few ploughings taking advantage of the timely rains. A week later, he fertilized the field with 1,000 lb. of green (*avarai*) leaves and after another week gave it two more ploughings till the field became completely miry. At this stage he applied ten cart-loads of compost manure (224 lb. of superphosphate mixed in the pit), then a final ploughing, followed by the application of 800 lb. of groundnut cake.

Now he levelled the land with the levelling board and planted the paddy seedlings brought from a dry nursery. Of course, he planted carefully—by putting two or three seedlings in a hole with a spacing of seven to eight inches. The first weeding was done by him 25 days after the date of transplantation and topping of the leafy portion after still another fortnight, since the crop had too much vegetative growth.

Again, the land was manured with 336 lb. of groundnut cake and 40 lb. of ammonium sulphate. The crop took on good growth and on the 75th day of the crop, topping of the vegetative growth was done for the second time. At the same time, the second weeding was given. Then he applied 224 lb. of *neem* cake. Just a fortnight before flowering, topping was done for the third time to prevent lodging and about 40 lb. of ammonium sulphate was applied to the crop the next day.

PEST CONTROL

Green jassids were found on the nearby fields and as a measure of protection 30 lb. of Gammexane D-120 were dusted on the crop. This prevented the pests from attacking the crop. The duration of the crop was 6½ months and the variety of seed used was 'Vellai Sirumaniam,' a local variety noted for its heavy yield. The crop was harvested in the presence of agricultural officials and prominent ryots.

Thevar has sunk a big well in his farm and has received a Government subsidy for installing a pumping set to assure a good water supply.

He is now experimenting on potato and mesta cultivation. Potato is usually grown in the hills but the Agricultural Department is introducing a, new variety for cultivation in the plains. Thevar is one of the pioneers of this experiment. Mesta is useful for the fibre it yields and also for its seeds from which a lubricating oil is extracted. The results achieved so far are quite satisfactory.

The vast tracts of barren land lying uncultivated around the village offer a challenge to a man of Thevar's calibre. His eyes glow when he tells his visitors how he longs to convert all the land into smiling paddy fields. This he would accomplish, when he wins a tractor in the all-India crop competition.

A good number of breeds are available for the poultry-keeper to choose from. The keeping of mongrels in any case is false economy

THE BREED YOU SHOULD KEEP

by

S. G. IYER

ONE common question poultry-keepers ask is what is the best breed to keep ?

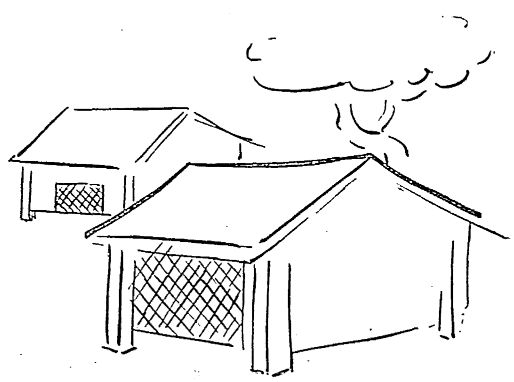
Many poultry farmers have been selecting pure-bred stocks generation after generation for the purity of type, colour or production. Such stock is more likely to produce offsprings with several of the desired characteristics and are any day worth the trouble than mongrels whose worth is never certain.

Certain breeders claim that a crossing of breeds stimulates egg production and improves the quality of meat. This may be true, but the same benefits can be obtained in a satisfactory way by sticking to one breed and giving it all care and attention. The keeping of mongrels is false economy.

Markets do influence the type of breed to keep. The breeder producing brown eggs is at a disadvantage when the market pays more for white eggs. A few years back, one would not have minded paying even a high price for a pure-bred stock and would even import them from outside. Subsequent difficulties in obtaining fresh blood resulted in breeding and cross breeding without thought to selection until the birds deteriorated greatly and became useless for breeding. However, things have changed now and there has been an improvement in poultry-keeping. Some of the Indian bred birds can very easily compete with those imported from overseas. Supplies are available from many individual poultry-breeders as well as Government farms, and it is possible to procure new stock unrelated to one's own birds.

All improved breeds have come from Great Britain, Australia or America. Importing of birds from Great Britain is becoming an important business in Bombay, Poona, Bangalore and other places. Imported birds are many times seriously affected by the voyage and take months to recover. There is also the fear of their bringing in new diseases. It is, therefore, best to demand a veterinary certificate regarding the birds prior to their export.

Ten-month old birds seem best for import as they stand the journey better and get acclimatised more



readily than older ones. The best time of the year to import birds is during the months of October and November because then they have to pass through the winter months before getting acclimatised. During this time chickens should be hatched in numbers and reared from them. The hot weather and rains may affect them adversely and, therefore, you have to pay a little more attention during these trying months. If they tide over the first year without any mishap, the hens will certainly do better in the second year and chickens will also be stronger then.

Hatching eggs can also be imported. The secret of success, however, lies not in starting with good birds alone but with carefully selecting, mating and breeding them.

VIGOROUS BIRDS NEEDED

A pure-bred hen laying 150 eggs in a year produces about three times her weight. For such a hard job a hen needs to be vigorous. The vigour is indicated by a bright full eye, bright red comb and wattles and a strong body with well-placed legs. A poultry-keeper, with some experience, can develop the ability to distinguish a good bird from a poor bird.

Many breeds are available for selection, but the strain is more important than the breed itself. Breeds such as the Rhodes, Leghorns, Minorcas and the Plymouth Rocks are preferred by poultry-keepers to a greater extent because these breeds have been bred for a number of years and have gained popularity in the country.

All fowls belonging to the American class which include Plymouth Rock, Rhode Island Red and Wyandotte, possess qualities which make them popular for the production of meat and eggs. They are birds of good size and have good meat. They are also clean-legged and have yellow skin and big shanks. All of them lay brown-shelled eggs.

Birds belonging to the Asiatic breeds such as the Orpington, Cornish and Sussex are of good size and noted for their excellent fleshing properties. They all lay brown-shelled eggs. The Orpington and the Sussex have a white skin while the Cornish has a yellow one.

The breeds of Mediterranean origin which include the Leghorn, Ancona and the Minorca possess qualities which make them popular as egg-producers. They are clean-legged with the Leghorn and the Ancona having a yellow skin and the Minorca a white one. All lay nice white-shelled eggs.

Fertilize Your Vegetables

Use the right fertilizer in the right dose and at the right time

ALMOST all vegetable farmers these days are using fertilizers for raising their crops. Not many of them, however, are conversant with the best way these fertilizers can be used for increasing vegetable production. When unexpected failures of crops occur, fertilizers are mostly blamed. It is quite possible that the real reason lies in the careless and indiscriminate use of fertilizers. Hence, it is necessary that fertilizers must be chosen with always the desired objective in view.

Farmers know that the three important plant foods necessary for the production of good vegetables are nitrogen, phosphates and potash. The fertilizers available in the market either provide one, two or all the three foods.

Nitrogen may be supplied as sulphate of ammonia, nitrate of soda, calcium cynamide (nitrolim) or as oil-cakes. Oil-cakes also contain some phosphates and potash. Superphosphates and bone-meal are the common sources of phosphates and muriate and sulphate of potash of potash. Generally speaking, sulphate of ammonia can be used for supplying nitrogen, superphosphate or bone-meal for phosphates and sulphate of potash for potash. These are best used in the form of a mixture.

WHAT NITROGEN DOES

Nitrogen encourages the development of leaves and shoots and imparts a deep green colour to these. It also makes the vegetables succulent. Nitrogen, say, in the form of sulphate of ammonia, should be applied to leafy vegetables like spinach, cabbage, lettuce, etc.

Tuber and root crops like carrots, turnips, potatoes, etc., and leguminous crops like peas, beans and the like should be given phosphates in the form of bone-meal or superphosphate. This fertilizer hastens the maturity of crops, promotes root development, improves the quality of the crop and increases resistance to disease.

Potash is essential for producing under-ground crops like onions, sweet potatoes, etc. A deficiency of potash results in abnormal leaf colour and weak stems. A mixture of potash and phosphates is considered necessary for the proper development of fruits and flowers. Such a mixture also increases the sugar-content of fruits, apart from speeding up their ripening.

For the plants to utilise the fertilizers properly lime also needs to be added to the soil. A dose of three to four ounces of powdered lime-stone per square yard of the area sown may be sprinkled over the soil a month before fertilizers are applied.

Farmers can sometimes find out whether the soil is deficient in any essential plant food by the look of the plant.

LACK OF NUTRIENTS

If the leaves show poor growth and have a yellowish colour, it is an indication that nitrogen is lacking in the soil. If the leaves show a greyish colour, it means that phosphates or potash are lacking in the soil. Lack of nitrogen, potash or phosphates results in a premature shedding of leaves. When the leaves appear scorched, it means there is an excess of lime in the soil, while if they are dark coloured and show curling, lime is lacking in the soil. If leaves are not uniformly green then it is an indication of insufficiency of potash in the soil.

Lack of potash gives fruits like tomatoes an irregular form. A scorched appearance in fruits is generally due to lack of nitrogen.

If grains, pods and roots are slow in ripening, it may be taken that there is an excess of nitrogen in the soil or a lack of phosphates. Lack of potash results in a failure of the fruits to ripen, while stunted roots are generally due to lack of lime and/or phosphates.

Farmers are again reminded that it is better to apply the fertilizers in the form of a mixture rather than singly. Experts have worked out recommendations on fertilizers for application to various vegetables. According to them the following are good schedules for application to summer vegetables:

For *arum* (*arvi*) and sweet potato, apply 200 lb. each of ammonium sulphate, superphosphate and sulphate of potash per acre before ridges are made. For bitter gourd (*karela*), sponge gourd (*luffa*) pumpkin (*petha*) bottle gourd (*loki*) and red pumpkin (*sheeta phal*) apply 100 lb. of ammonium sulphate, 250 lb. of superphosphate and 80 lb. of sulphate of potash per acre before sowing. Cucumber (*kheera*), squash (*vilaiti kaddu*), snake gourd (*chichinda*) and *parwal* need 100 lb. of ammonium sulphate, 300 lb. of superphosphate and 50 lb. of sulphate of potash per acre before sowing. Melons (*tarbuz, kharbuza*) require 250 lb. of ammonium sulphate, 400 lb. of superphosphate and 100 lb. of sulphate of potash per acre. Addition of lime at one ounce per square yard is also found helpful to the melons.

Bhindi, brinjal (*baingan*) and chillies need 250 lb. of ammonium sulphate, 600 lb. of superphosphate and 150 lb. of sulphate of potash per acre. If you are growing plantains (*kela*), apply three pounds of ammonium sulphate, three pounds of superphosphate and one pound of sulphate of potash per plant in the first year and one pound of ammonium sulphate, half a pound of superphosphate and quarter pound of sulphate of potash in the second year.

FOR WINTER VEGETABLES

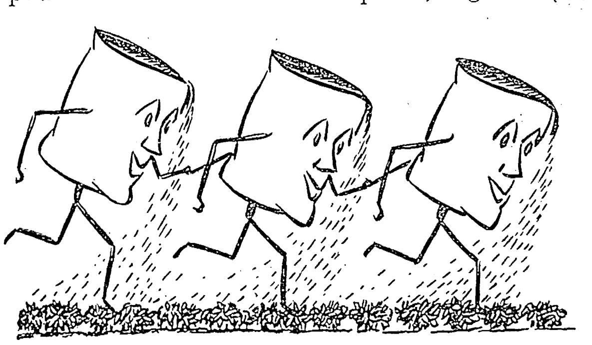
The following are the fertilizer schedules for winter vegetables:

Give 250 lb. of ammonium sulphate, 600 lb. of superphosphate and 150 lb. of sulphate of potash per acre for your tomato crop. Three-fourths of this can be applied at planting and the rest before flowering starts. No lime is necessary for tomatoes. For onions give 200 lb. of ammonium sulphate, 750 lb. of superphosphate and 150 lb. of sulphate of potash per acre. If poor colour or a development of thin scales is seen, add 50 lb. of copper sulphate per acre to the soil.

Beans (*bakla sem*), French beans and lablab (*sem*) require 200 lb. of ammonium sulphate, 400 lb. of superphosphate and 100 lb. of sulphate of potash per acre before sowing the crops. Similarly, peas require 100 lb. of ammonium sulphate, 300 lb. of superphosphate and 50 lb. of sulphate of potash before sowing. For carrot (*gajar*), beet root (*chakandar*), radish (*mooli*) and turnip (*shalgam*), apply 250 lb. of ammonium sulphate, 500 lb. of superphosphate and 200 lb. of sulphate of potash per acre.

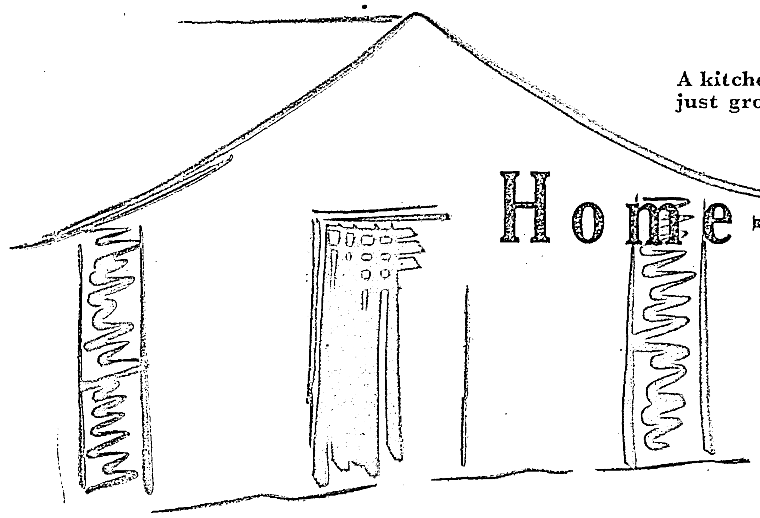
For beet root and turnips add one ounce each of lime and salt 15 days before sowing.

For potatoes (*alu*) no lime is necessary, but apply 500 lb. each of ammonium sulphate and superphosphate and 50 lb. of sulphate of potash. For lettuce (*salad*), celery (*shalary*), spinach (*palak*) and Indian green (*sag*) apply 400 lb. each of ammonium sulphate and superphosphate and 50 lb. of sulphate of potash. Lime need not be applied to these vegetables unless found necessary.



Cabbage (*bandh gobhi*) requires 200 lb. of ammonium sulphate, 500 lb. of superphosphate and 100 lb. of sulphate of potash. The mixture

(*contd. on page 21*)



A kitchen-gardening experiment that was more than just growing a few crops for home consumption

Home-Stead Farming

by

B. L. Choudhry

I WOULD prefer to call it kitchen-gardening. In a broad sense, it is to meet all the needs of a kitchen from an available, though small, plot of land.

Almost all the Sarvodaya centres in India take to homestead farming or kitchen-gardening on whatever area that is available for this purpose. Such a farm helps in achieving self-sufficiency in food and vegetables, the degree of sufficiency depending largely on the area of land available. It will also mean putting into actual practice what is being preached by way of dignity of labour.

Homestead farming offers the workers to look to something as their own to work on. Otherwise, they are likely to feel frustrated in a village atmosphere.

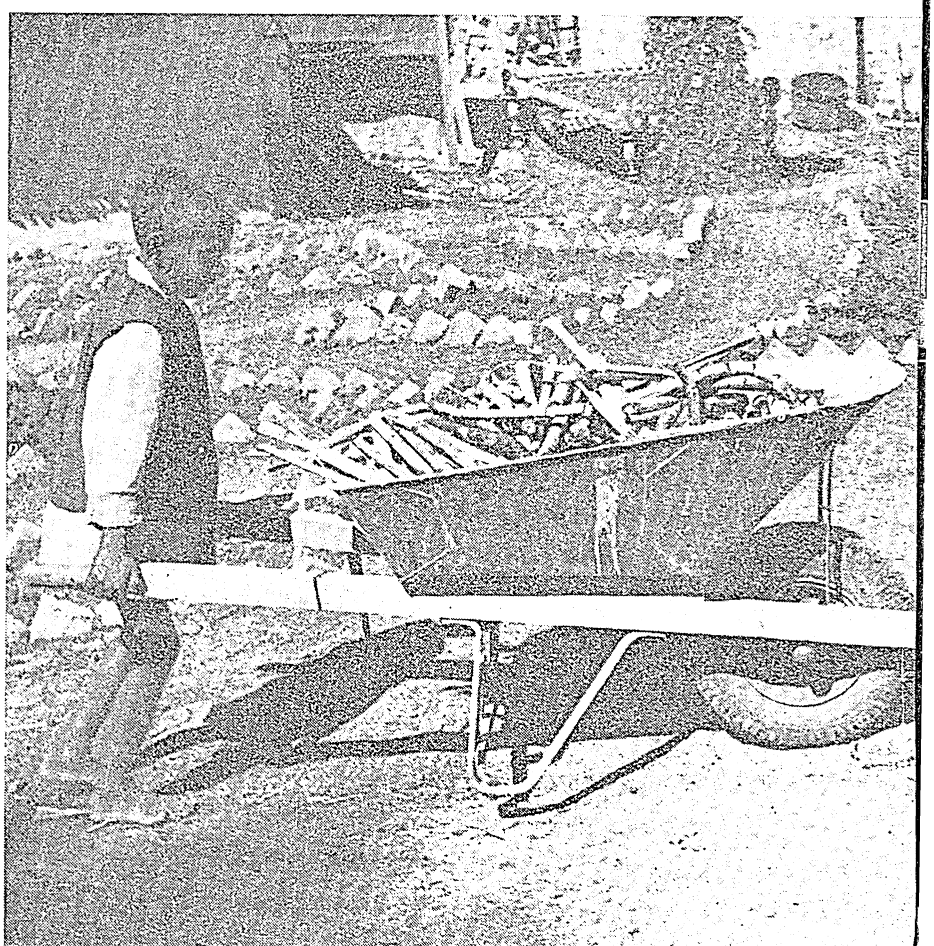
Incidentally, this type of farming offers possibilities of finding out the basic needs of a family on a small farm, the ideal being that a small farming unit should provide full employment for a village family and make it self-supporting. It will also be possible to work out the economics of such a unit.

At the Sarvodaya Centre, Taronda-Nitaya, Hoshangabad, an experiment on homestead farming was undertaken which gave us a way to live at the villagers' level of living. At the Centre here, we are six in all, three of us trained in agriculture and the other three being youths from the villages getting themselves trained in agriculture. Besides the six, a Kasturba Gram Sevika and my wife also help in jobs like transplanting, picking fruits, etc. from time to time.

A small plot of 0.79 acre, with big trees and thorny shrubs had been given to us as a donation. We cleared this out for building houses for the workers. These occupied 0.29 acre.

Later, we were permitted to occupy a government plot of 1.42 acres. We exchanged this for

The wheel barrow really took the load off our heads



another plot attached to our own. The farmer who did the exchange allowed us the use of a half acre of his land in addition. Thus we had to our credit a consolidated area of 2.7 acres. The village road, however, goes through the plot, splitting it into two.

This plot suffered from some disadvantages, however. The soil was of inferior type. It had been badly eroded. No manuring had ever been done to it. Being close to the village, we also had to face the nuisance of stray cattle.

We wanted to experiment and find out what crops could be grown there best. But since we got possession of the area in June 1953, we had very little time for that. However, we planned on a broad basis and decided to put vegetables in one block and wheat in another.

GARDEN OPERATIONS

All operations such as digging, preparation of seed-bed and field for sowing, mulching, irrigating, weeding and harvesting were done by the workers and no outside labour was engaged. During the peak time, every one of us gave as much as 10 hours of labour a day. Later on, however, the work needed only about three hours of our time. That gave us latitude for other work.

Land improvement work was done on a contract basis. The wheat plot was harrowed and ploughed by the villagers and later at sowing time and when the villagers could not spare their bullocks and implements, we had to engage bullocks on hire.

We got three CARE tool kits on donation and two improved iron ploughs as gift. We had an excellent wheel-barrow, placed at our disposal by the Friends' Rural Centre, Rusulia. With a little practice, we gained sufficient proficiency in the use of these implements and found them efficient and easy to work with.

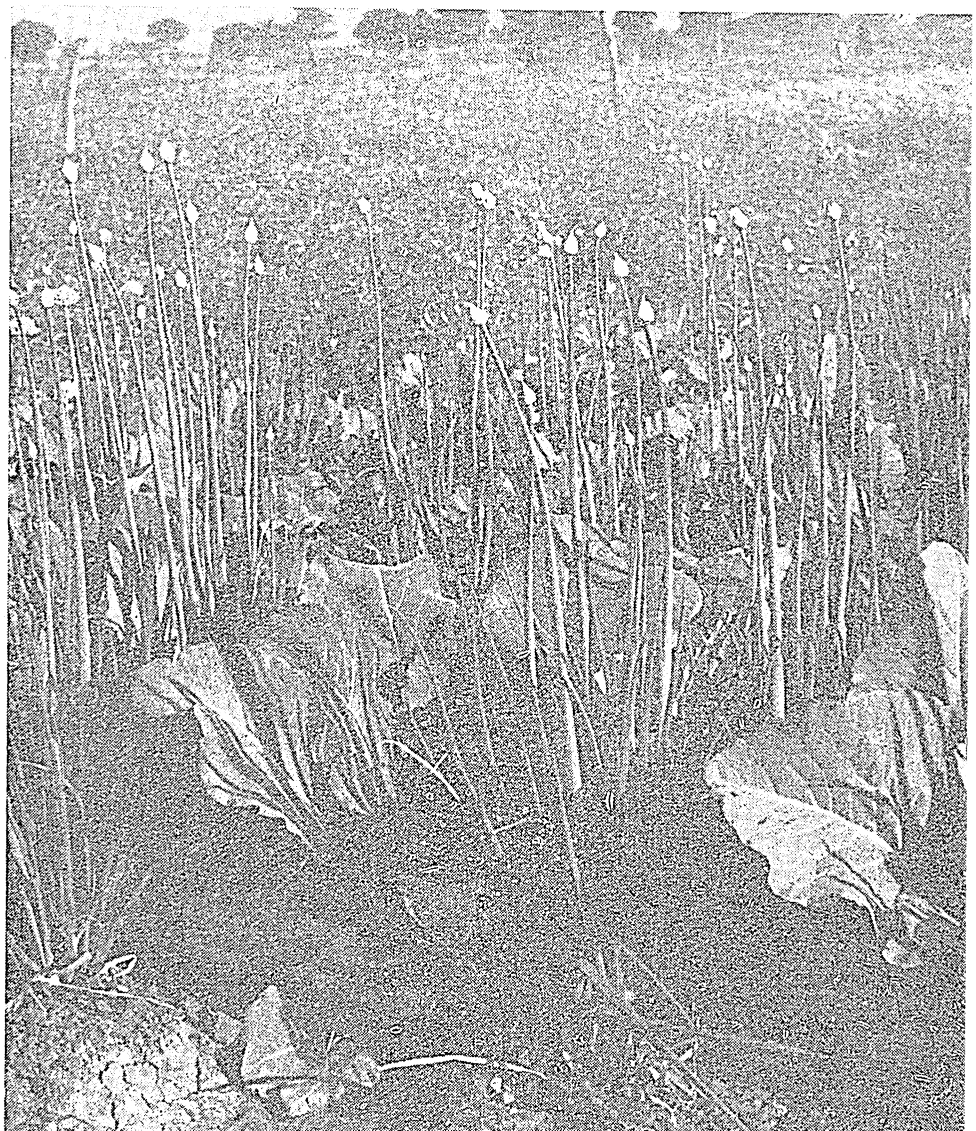
WRONG DECISION

Since our unit could not support a pair of bullocks, we did not maintain any. When the question of irrigation came up, we had to decide whether we should go in for a Persian wheel and a pair of bullocks or an oil engine. Due to various considerations, we finally decided on the oil engine. We regretted, however, our decision later. When under village conditions even to get a nut or a bolt for the engine is difficult, it was wrong to have thought of an oil engine. Our set went out of order, especially when we needed it most, and our plan for supplying water to our crops was completely upset.

To find out what manurial doses were best suited for wheat and to show the villagers the merits of manuring the crop, we laid out a small experiment on our plot.

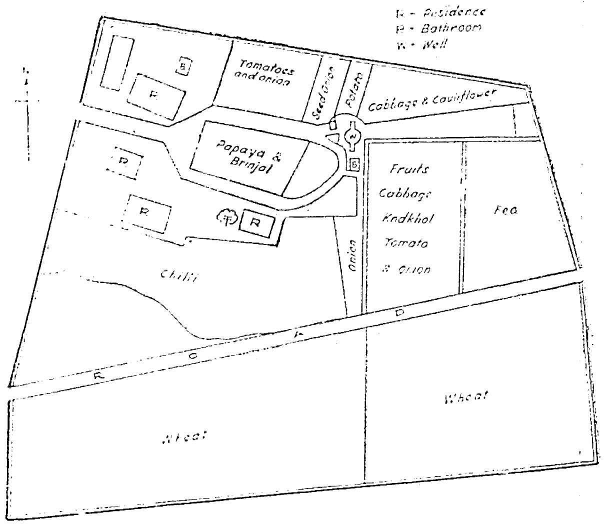
The variety of wheat we sowed was No. 25. The crop received a basal dressing of five cart-loads of compost per acre. The fertiliser treatment we tried was the application of ammonium sulphate, phos-

Onion for seed and cauliflower were grown in combination



phonil, ammonium nitrate and amophos in different plots at 50 pounds per acre. The fifth plot did not receive any fertilisers. The fertilisers were applied with the seed. The crop received one irrigation. We harvested the plots separately and got the following per-acre outturn :-

Plot receiving	*Yield per acre*
Ammonium sulphate	1,260 lb.
Phosphonil	1,370 lb.
Ammonium nitrate	1,330 lb.
Amophos	1,300 lb.
No fertilizer	980 lb.



This was the lay-out for our homestead farm

The experiment was purposely laid out close to the village road so that it might serve as a small visual demonstration for the villagers. The government farm at Powarkheda obtains about 2,400 lb. of wheat per acre on some of its fields. Our ambition is to raise our yield to 2,000 lb. per acre.

VEGETABLE VARIETIES

In the other block, we raised a variety of vegetables. Chillies, brinjals, tomatoes, cabbage, cauliflower (double-cropped with potatoes), knol khol, potatoes, garlic, radish, greens, coriander, gram, onions (both for bulb and seed) were the crops tried, each one of them occupying an area ranging from five cents to half an acre. We grew papaya in combination with brinjals, citrus with onion, and plantains with brinjals. Up to 0.40 acre was double-cropped. Excepting for onion raised for bulbs which failed for want of irrigation, the rest of the crops came up well and gave us an income of Rs. 616-15. On the expenditure side, we spent Rs. 368-7. Taking into account that approximately Rs. 40 worth of carrots, peas, green gram, etc., were given free to school children and we paid Rs. 80 by way of charges for harvesting the crops to members of the Youth Club, and also that we sold the vegetables at cheaper rates to encourage villagers to take to vegetables, our total income would have come up to Rs. 786-15, and deducting our expenditure from this, we would have had a net profit of Rs. 418-8.

VALUABLE EXPERIENCE

The handicaps we met with notwithstanding, we got valuable experience in the homestead farming experiment that we conducted. It showed us that village service entries can be made self-supporting so far as food and clothing are concerned. An area of five acres will be a handy unit to work on. For such work, bullocks and not engine power should be relied upon. An initial outlay of Rs. 5,000 will be required to work such a unit. This expenditure will meet the cost of a well (Rs. 1,000), bullocks (Rs. 500), fencing (Rs. 500), seed, manure and accessories (Rs. 500), maintenance for the first year (Rs. 750) and a Persian wheel (Rs. 1,000).

On such a centre, at least two families of workers will have to devote their attention. On an average, not more than three hours need be spent on such work. Apart from growing crops, the maintenance of a breeding bull, bee-hive, a flock of poultry (depending upon the locality) and a set of improved tools can well be done on such a centre for the benefit of the villagers. The centre can then turn out to be a very good ocular demonstration for the entire village.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITORS, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

A typical farm home in the area

From SWAMPS to smiling GREEN

THERE is nothing impossible to human endeavour and ingenuity. How else could the vast bleak marshes infested with aquatic weeds, venomous snakes and deadly malarious mosquitoes, only 28 miles south-east of the city of Calcutta, could once again be enlivened with agricultural activities ?

Due to the rapid siltation of the outfall of river Peali and lack of drainage facilities, a basin area of about 57 sq. miles under Sonarpur and Baruipur Police Stations had become completely water-logged, remaining unproductive for the last two decades. During the rainy season nothing could be seen in the area excepting a vast sheet of water dotted with widely scattered villages on small islands. These villages were inhabited by a most daring type of people bereft of all amenities of modern life and engaged in a perpetual strife for existence. Only during winter, the tranquility of the place used to be occasionally disturbed by the boom of the gun shots fired by the hunting parties coming from the city in search of game birds.

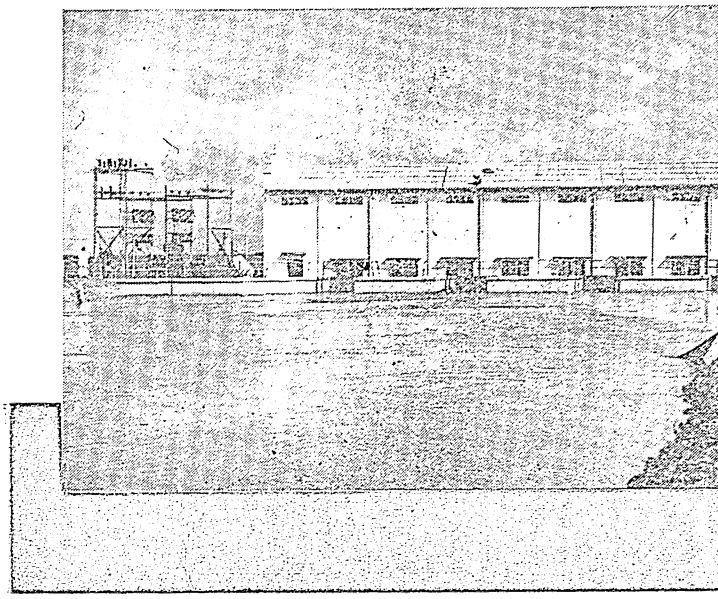
Fields ready to receive the crops

In a determined bid for reclaiming every inch of this land for the much needed food production, the Sonarpur-Arapanch Drainage Scheme was launched by the Government of West Bengal. An area of about 57 sq. miles bounded by the Tolly's Nullah and the Bidyadhari river on the north, the Peali on the east and the Baruipur-Uttarbhag Road to Garia on the west is sought to be brought under cultivation. This is a unique project in West Bengal and perhaps in India, under which swampy land is proposed to be reclaimed and brought under the plough by means of four gigantic electrical pumps discharging 3,75,000 gallons of water per minute.

The Scheme is also expected to provide electricity to the semi-urban areas of Garia, Sonarpur and Baruipur making them ideally suited for rehabilitation of displaced persons.

Already an area of about 30 sq. miles has been dewatered and made available for *kharif* and *rabi* cultivation. With the emergence of the land from its watery grave arose the dispute for ownership of land in some of the areas where delimitation of the boundaries was completely lost. Government, however, could lose no time in going ahead with the Scheme as the *kharif* sowing season was advancing fast.

The Directorate of Agriculture commissioned its fleet of 14 tractors with other mechanised units and a band of enthusiastic workers on the 13th June, 1953, for raising *aman* paddy on about 1,400 acres. Even under such heavy odds as frequent accumulation of rain water over the fields up to a height of about two feet or more having occasional water pockets, the inrush of water from the adjoining canals through breaches in the embankments, want of suitable seed-beds for raising seedlings and a thick growth of typhae and other aquatic weeds and the presence of venomous snakes, leeches and the foul stagnant water, the worker proceeded with the work with a resolute mind and the area having a perimeter of 13 miles without even the semblance of a shelter fell inch by inch to the advancing tractor ploughs and harrows. The wheeled type



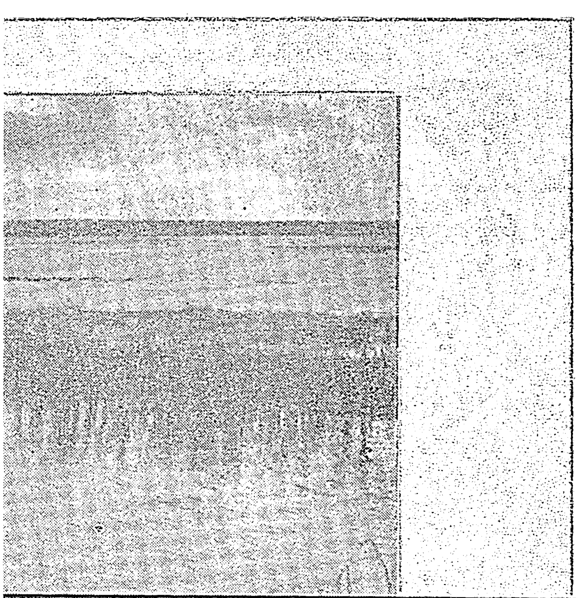
The plant that pumps out water from the swamp

tractors were suitably modified by what is known as "Bower" attachment, for wading through knee-deep water and mud for various cultural operations—a unique feat in low land cultivation in the country. With perfect co-operation from the different Government Departments and the local people the work progressed in a nicely planned way.

In the meantime organisations were also set up to settle the land disputes and the owners whose lands were tilled by the Directorate of Agriculture were entitled to get one-third of the produce obtained on production of the proof in support of their claims. The balance of two-thirds was to be distributed, to the extent felt necessary by the Government, as improved seed in the surrounding areas.

In this way, it has been possible to get a good harvest of *aman* paddy crop from a vicious swamp of about 900 acres. Twenty-one thousand maunds of paddy and 30,000 md. of straw have been obtained in one cropping season, yielding a gross income of Rs. 2,06,000. The expenditure incurred under the different heads amounted to about Rs. 1,56,965 till the end of March last. Owners of the land have after a lapse of 20 years, for the first time, received their share of the produce on presentation of proof of their claims.

The neighbouring farmers who had first watched the operations with doubt, were soon imbibed with a spirit of enthusiasm to take up cultivation of their freshly reclaimed land, and in consultation with the local officers of the Department of Agriculture, often being helped with seedlings, agricultural cash loans, etc., have successfully cultivated nearly 11,000 acres which had not got the touch of a plough for a long time.



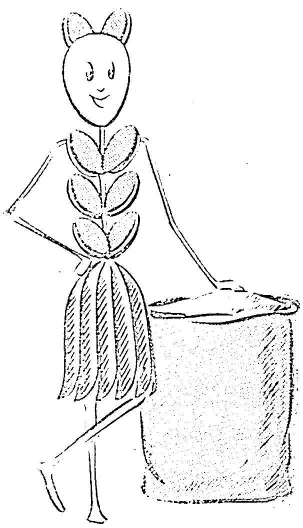
WHAT'S NEW IN FARMING

GREEN MANURING

GREEN manuring, one of the easier ways of increasing soil fertility, is gradually spreading on Indian farms. The practice is being widely adopted in Uttar Pradesh, particularly, in the Mahawa circle in Etawah district. Farmers here are of opinion that crop yields are much better when green manure is used than when chemical nitrogen is used.

A recent survey showed that with green manuring the yield of wheat per acre was 35 md. 20 sr. 6 ch., whereas with the use of ammonium sulphate the yield was only 29 md. 29 sr. and 5 ch.

Experience has shown that sannhemp, indigo, *dhaincha*, *guar*, *senji* and *Moong* No. 1 are more suitable for green manuring. They are capable of supplying 30 or more seers of nitrogen per acre and about 300 maunds of vegetable matter. If green manuring is intended for the winter crop, the seed should be sown immediately after the first rains in the preceding monsoon season. Where irrigation is possible, the seed may be sown a little earlier so that the crop may attain greater growth before it is ploughed under. If the green manure is meant for monsoon crops, seed should be sown in winter, but this is possible only if irrigation facilities exist.

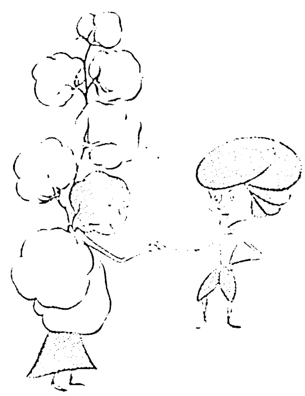


The right time to plough under the green manure crop is when the plants are just about to flower. A couple of showers after the crop has been ploughed under are essential to help the standing green matter to decompose. The crop should be planked down before ploughing. When the plants lie parallel to the direction of the plough, the green manure will be more completely buried by the soil-turning plough than when the plants stand erect. It may be advisable to plough the area a number of times, so that the decayed vegetation may be thoroughly mixed with the soil. This usually takes from four to five weeks.

Green manuring is, incidentally, the least expensive among different methods of nitrogenous manuring.

LAXMI COTTON

Laxmi, an outstanding type of cotton grown largely under rain-fed conditions in the Gadag area of Bombay State, is doing very well in the Bellary district in Andhra State. The new cotton was introduced two years ago and in spite of droughty conditions that prevailed during the time, has yielded one and a half times Westerns which had occupied the area till now.



Laxmi has also been found suited for sowing in early and mid-seasons in mixed cropping with *korra* and groundnut in light soils and as a pure crop in the *mungari* season in heavy soils. The higher yields and prices of Laxmi have made farmers readily take to this variety and the area under it shot up from 5,000 acres in 1951-52 to over 30,000 in 1952-53 and in the 1953-54 season, it is estimated to occupy almost two lakhs of acres.

DRY SEED-BEDS FOR RICE

Some modifications in the method of raising dry seed-beds advocated under the Japanese method of rice cultivation were successfully tried recently at the Paddy Research Station, Titabar. The modifications were necessary because of the heavy rainfall conditions prevailing in Assam.

The seed-beds were prepared under semi-dry conditions. They were of the dimensions 50 ft. × 4 ft. and raised about six inches above ground level and the space between individual plants was increased to one and a half to two feet. The edges of the seed-beds were reinforced with rice straw, water was then let in and the channels kept flooded.

Sprouted seeds were sown in the seed-beds. This gave the advantage of the seed getting quickly fixed in the soil, minimising loss of seed.

The seed-rate of one pound for 50 ft. × 4 ft. seed-bed advocated under the Japanese method was found suitable for the medium varieties but for the coarse varieties, it was increased to one and a half pounds and for fine varieties, less than a pound was used.

Another modification introduced was to increase the width from four feet to eight feet, as under puddled conditions the weeding of the seed-bed was not found necessary.

The seedlings grew quickly and were ready for transplanting in three to four weeks.

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For the Village Worker

GETTING THE VILLAGER TO WORK

Way to conduct village group discussion for leading villagers to co-operative action

MANY of the major problems of the Indian village can be solved only through co-operative action.

A well-organised village group discussion, properly conducted, is the best practice for co-operative group action. In fact, it is the first step in co-operative effort.

Co-operative group action requires the skill of all members. It requires that the villagers develop the habit of talking, thinking, planning and working as a group.

People become accustomed to group action and become skilful in it only by practice. It is the Village Worker's job to give the villagers every chance to practise co-operative group action.

A discussion of this nature requires that each member should listen to the ideas of other members even though they may not approve of the ideas, but this type of discussion will give a chance to each member to express his or her own views. Members must learn to put the interest of the group above personal interest.

In a democratic group discussion, the leadership is shared among all the members instead of being monopolised by one person alone. This way all members get practice in leadership. Such a practice develops the type of unselfish and democratic leadership needed for successful co-operative group action or community development.

VILLAGE ACTION GROUP

As a village discussion group grows and gains confidence in itself, it will naturally become a village action group. The Village Worker must carefully lead the group to see the need for action.

Discussion in backward villages for the sake of discussion is ridiculous and futile. Without action these villages cannot improve.

In the beginning, it is the Village Worker who should assume leadership and initiate discussion to provide the needed initiative and knowledge. The group then should be so organised as to get the skill needed for democratic group action.

Joint action being the goal of these group discussions, his intention should be to see that ultimately the group attacks and solves a common village problem without his help.

The first step towards joint action will be getting a small group of villagers to meet and discuss a common problem. If it is not possible to get the villagers to meet as a group, it may be that the Village Worker can collect 20 to 25 villagers and advise them and guide them on some particular problem. If he finds that the problem is of interest to most villagers, it can then become the topic for the first discussion.

PRINCIPLES IN PLANNING

The Village Worker must put some general principles to work in planning. Firstly, he must be prepared for the discussion. For this he must study the problem to be discussed beforehand and think about it in relation to the interest and ideas of the group. He must have reference material, if possible, and also pictures or charts or any other visual aids that might help aid the discussion.

People think better if they are comfortable. Therefore, it is necessary to select the best meeting place and the most convenient time to hold the discussion. It would be also necessary to know the names of every member present there.

The group should be seated in a circle. Thereby every member would be able to see the faces of all others. The atmosphere of the meeting should be friendly and informal. The Worker must encourage all to take part in the discussion.

The group should be allowed first to define the problem. If that has not been done, a clear question should be put before the group at the commencement. The leader's opinion, however, does not count. His first job would be to bring out the ideas of the members of the group.

Speech-makers should be stopped. Speeches spoil group thinking. Talks must be limited to two minutes or less if possible. The speech-maker, however, should be stopped tactfully. If he is allowed to ramble on he will ruin the discussion. One way to stop him is by saying, "let us hear what some one else thinks about this idea." That 'some one else' can even be named. However, the rule should be to put direct questions to the group rather than to any individual. It is possible that some members are too shy to talk. Such people should be encouraged to take part in the discussion. Direct questions can be put to them to encourage them to join in the talk. It may also be indicated that the answers given are good by way of further encouragement. The ideas of any member of the group should never be ridiculed. The leader should keep the discussion moving, but never drive it sternly.

The discussion group should be guided towards action. It should be guided to take decisions and start planning.

TECHNICAL INFORMATION

The group should be led to seek technical information and help. It will need such technical help to solve several problems. It should be led to decide to consult specialists when the need for information arises. Members should be helped to make their own arrangements with specialists.

For presenting facts make use of visual methods. Visual materials like films, posters, exhibits and demonstrations often make a problem so real that the villagers readily see the need for action.

Sight-seeing trips should be arranged by the Worker for the villagers to get facts. The village discussion group can be led to plan trips to other villages where improved practices are being carried out. Sometimes progressive farmers from other villages may be invited to attend group meetings to narrate their own experiences and ideas.

In organising group discussions, the work of the village leader will resolve itself in the following steps:

(i) Recognising the common problem and getting the villagers to recognise the problem. If the villagers are already aware of it then this step will not be necessary;

(ii) finding the facts needed to solve the problem. Facts already known by members should be brought out in the discussion and when this is done the group should be led to seek facts from outside;

(iii) all known facts should be considered in relation to the local problem. Then the group should be made to examine and test all facts;

(iv) getting the group to reach a decision for action. Such a decision should be in agreement with the facts brought forth;

(v) planning a joint course of action. The plan has to provide the answers to who, when, where and how, what materials would be needed and how they could be obtained;

(vi) getting down to work. This is the goal of all discussion and planning. If this step is not reached, the Village Worker has as good as failed because it is this step that builds confidence and enthusiasm in the village. It is this step which draws villagers together as an effective group. Each time the villagers solve a problem by this method, they would be nearer to achieving the habit of co-operation.

(*Contd. from page 11*)

should be applied half at sowing and the rest before earthing up. Lime at one ounce per square yard will also be helpful.

Knol khol (*ganth gobhi*) should be given 400 lb. of ammonium sulphate, 600 lb. of superphosphate and 100 lb. of sulphate of potash per acre. For cauliflower (*phool gobhi*), a dose of 400 lb. of ammonium sulphate, 750 lb. of superphosphate and 150 lb. of sulphate of potash should be given.

TO OUR READERS

We beg to announce that with effect from the 1st April, 1954, Messrs. Associated Advertisers & Printers Ltd., 505, Arthur Road, Tardeo, Bombay-7, have ceased to act as "Agents" of the Indian Council of Agricultural Research. All business and other enquiries as well as remittances on account of subscription for "Indian Farming" and advertisement charges, so long addressed to the above firm, should now be addressed to the Secretary, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi-2.

—*Editor*

Is Your Child Healthy?

A HEALTHY, growing child has an appetite, they say, like a horse.

He has other traits too. His eyes are bright and sparkling, movements brisk and active. His skin is of good colour with a quality of firmness and elasticity in it. His hair has a healthy, natural gloss. He shows steady good growth in weight and height. He enjoys life and with him in the house you enjoy life too.

But every household is not blessed with a child that gladdens the heart. You will find children pinched, puny, pale, thin or puffed out, flabby, small-boned, with the skin dull, the hair lifeless and eyes tired. Such children are listless and sluggish and lack enthusiasm for work and play.

MALNUTRITION

These are the children that suffer from malnutrition. They may have a dry, rough skin which loses its elasticity or may develop a shiny appearance. The front and sides of the thighs, and the back of the arms and the shoulders of such children will, probably, be rough to touch.

This condition is due to a lack of vitamin A in the food given to them.

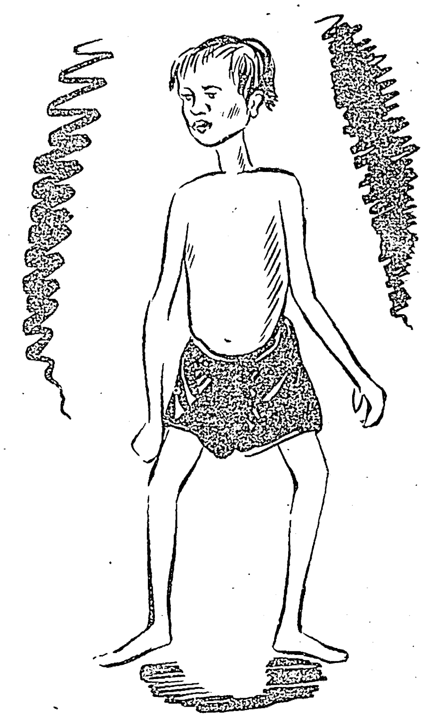
The vitamin being very essential to health, the child develops, what is called night blindness. The child's eye-sight, which is normal during day time, fails completely at night.

WORSE EFFECTS

If this vitamin-shortage is allowed to go on for some time further, worse effects will be seen in the child. The white of the eye loses its glistening whiteness, gets dry, dull and smoky and later will tend to wrinkle. If this condition is allowed to continue, it may ultimately destroy the eye of the child.

The condition, however, can be corrected by feeding the child with foods rich in vitamin A. Shark or Cod liver oil, butter, eggs, spinach and other green leafy vegetables and fruits like mangoes, papaya and tomatoes are some of the foods rich in vitamin A.

It is common for children to lose appetite and lose vigour. Such children will also have digestive disturbances and are easily irritable. Such a condition is mostly seen in children for whom milled or polished rice forms the main diet.



To correct this defect, which is due to lack of vitamin B in the diet, children should be fed with green leafy vegetables, groundnut or eggs and fleshy foods for those who may partake of them. The liver is an excellent source of this vitamin.

VITAMIN B DEFICIENCY

Vitamin B deficiency also leads to little heaps of whitish sodden skin at the corners of the mouth and fissured and sore angles. Sometimes the tongue will also be red and sore. The remedy would be naturally to give the child the missing element in the food. Milk which is rich in this, is specially recommended for the growing child.

Another disease caused by vita-

min B deficiency shows symmetrical patches of redness on cheeks and hands, looking like severe sun-burn. Later on, these parts and specially the face, hands and feet, get rough and ulcerated. Diarrhoea may also be caused. To get over this defect, children should be given wholemeal *atta*, good *dal* and groundnut.

Another disease associated with children is what is known as scurvy. Sore spongy gums with a tendency to bleed easily and sometimes bleeding from the nose or patch in the skin can also be seen. The disease is due to lack of vitamin C. Hence, children should be given foods containing this vitamin. Fruits and green vegetables and tomatoes are rich in vitamin C.

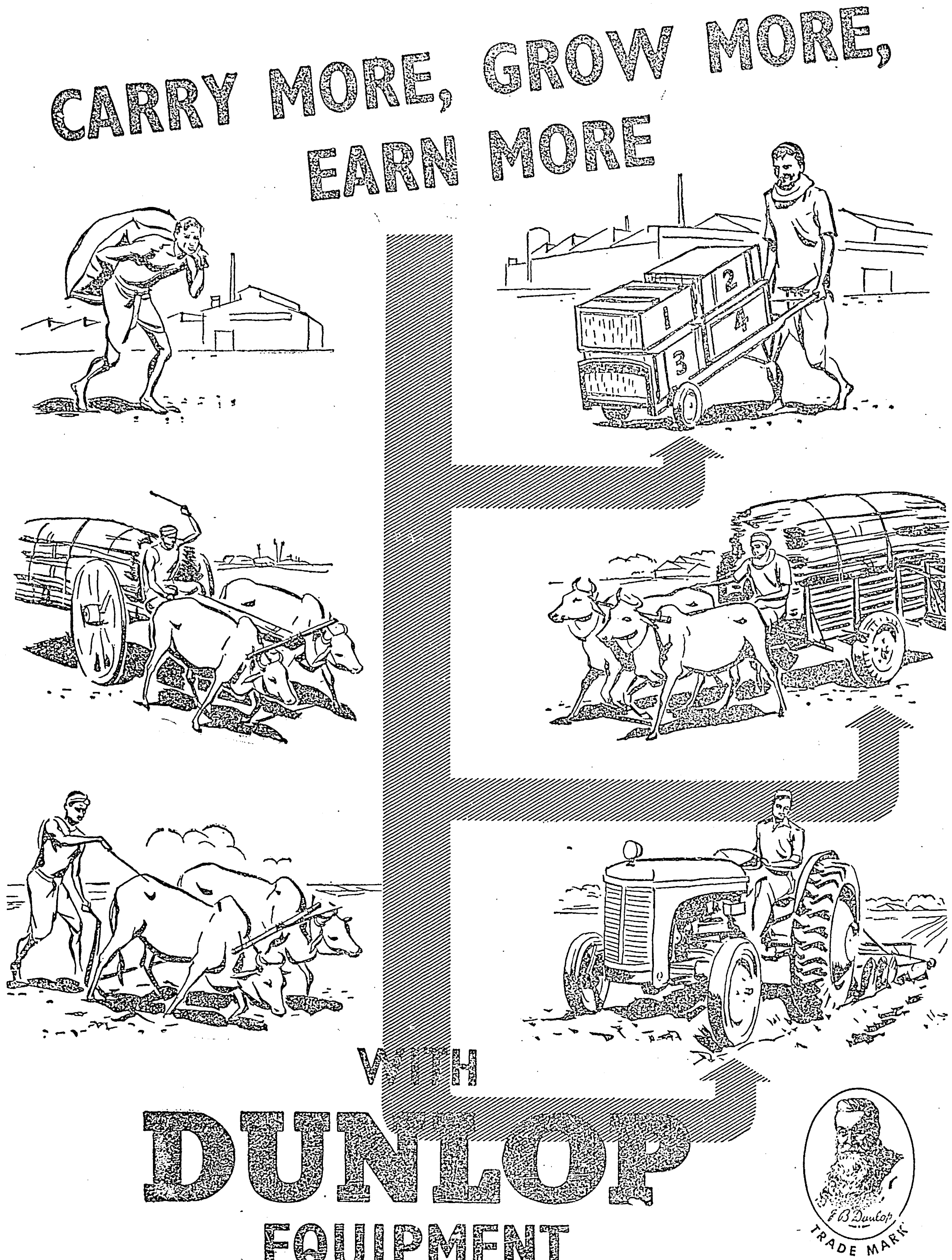
If you look at the child's teeth and find ill-fitting or bad biting teeth or prominent or distorted teeth, it may all be due to lack of vitamin D and calcium in the diet.

MALADJUSTED TEETH

It is so difficult to set right maladjusted teeth at a later stage, and since teeth are so essential for chewing the food properly, correct feeding of children is very important.

Vitamin D and calcium deficiency also causes rickets causing bow legs or knock-knees. Fortunately, the sun provides vitamin D in abundance and children romping in the sun will get enough of it, but the body must have enough calcium and hence the intake of milk and green vegetables should be sufficient to supply the deficiency.

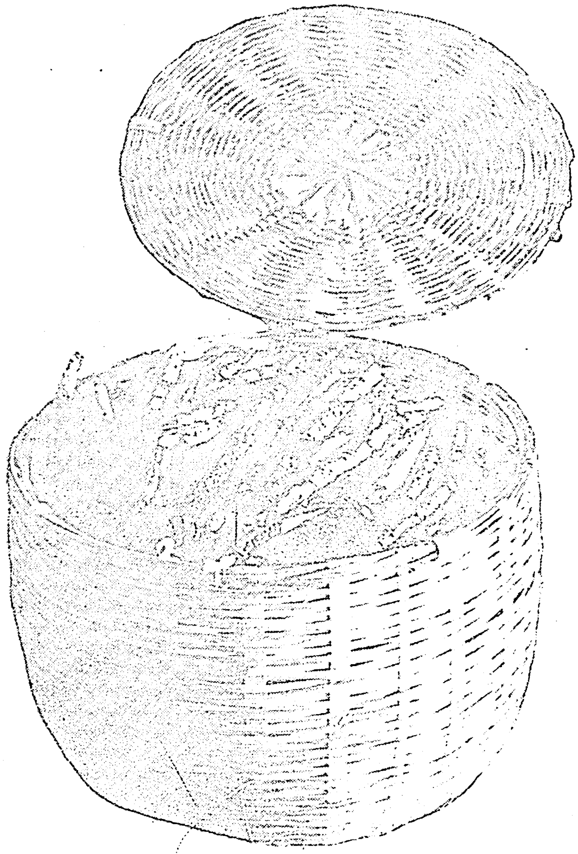
If the mother were to take sufficient precautions to see that the child gets the vitamins so essential for the health and growth of the child, it will not be a victim of deficient diseases.


CARRY MORE, GROW MORE,
EARN MORE
1
2
3
4
WITH
DUNLOP
EQUIPMENT
J B Dunlop
TRADE MARK

With some improvements, can be a more paying subsidiary occupation

LAC CULTIVATION

by
A. P. Kapur
Entomologist, Indian Lac Research Institute, Namkum, Bihar



Broodlac packed in a bamboo basket and ready for despatch by rail or road

TO a large number of rural people in some of the states of the Union, lac cultivation provides a paying subsidiary occupation. Apart from this, lac is a valuable foreign exchange-earner, the annual exports averaging Rupees ten crores and over in recent years.

Lac is produced by a small insect, the lac bug, which, when newly born, is much smaller than a pin-head.

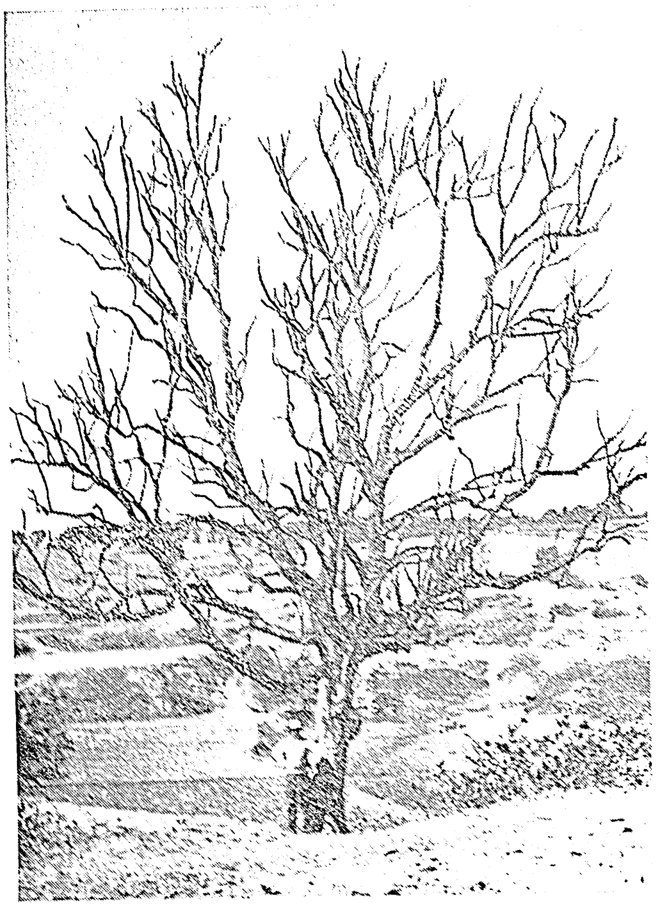
India is a chief source of supply of lac in the world, its annual production being nearly 80 per cent of the total world production. Though Thailand and Burma also produce lac of some commercial importance, because of its superior quality, Indian lac is generally preferred. Lac is found in most parts of India but the more important States which produce it are Bihar, Madhya Pradesh, West Bengal, Vindhya Pradesh, Assam, Orissa, Bombay and Uttar Pradesh. Other States like the Punjab, Madhya Bharat, Bhopal, Mysore and Madras also produce lac, but in smaller quantities.

Of the total of about 11,42,000 maunds of sticklac produced annually in the Union, Bihar (Chota Nagpur Division, Santhal Parganas and Gaya district) alone account for more than half of the production (about 6,73,000 maunds annually). Areas adjacent to Bihar in Madhya Pradesh, West Bengal, Vindhya Pradesh and Orissa are also important producers. Mikir, Garo and Khasia Hills in Assam have been well-known sources of sticklac from the early times.

The cultivation and collection of lac is mostly in the hands of farmers and aborigines who live on the outskirts of forests where host plants on which the lac insects thrive abound. Mostly, small agricultural families who acquire on lease or own a few scores of trees on their holdings, practise lac cultivation. The investment thus is very little and since the operations are looked to by the families, expenditure also is brought down to a minimum.

Lac cultivation is a very important subsidiary occupation of Chota Nagpur farmers, as elsewhere. It is better so as being a subsidiary occupation, it ensures

Selecting broodlac prior to infection or marketing



A pruned tree of kusum. As it is a slow-growing tree, it should be pruned lightly

low cost of cultivation and low sale price, thereby keeping off keen competition from synthetic substitutes, which there would certainly be if prices of lac were to rise. Under the present conditions it does not look as if lac cultivation can be done cheaply on plantation basis unless cultivation methods are radically changed to reduce expenditure on higher labour and supervisory charges.

The lac insect lives on the sap of certain plants, the more important of which are the *palas* or *dhak* (*Butea monosperma* Syn. *B. frondosa*), *ber* or *kul* (*Zizyphus jujuba*) and *kusum* (*Schleichera trijuga*). The young ones of the insect or nymphs, as they are called, settle rather gregariously upon succulent shoots of these plants and start secreting lac round their bodies. Within a short time, this secretion takes the form of small lac cells with three openings through which waxy filaments of the insect protrude which can easily be seen with the naked eye. The grown-up female, however, is very unlike other bugs and has a body somewhat like a bag enclosed in a resinous cell. The cell itself may be roundish or oblong, but is usually not more than 1/8th of an inch long when fully formed.

The male is much more like other insects in shape and has three pairs of legs, a pair of antennae, the eyes and in certain cases a pair of wings. This also develops inside a resinous cell which is elongate in shape. It is much smaller in size than the female and has a shorter life.

As the lac insects grow, thousands of lac cells, situated close together on a twig, coalesce and come to form a contiguous encrustation of lac.

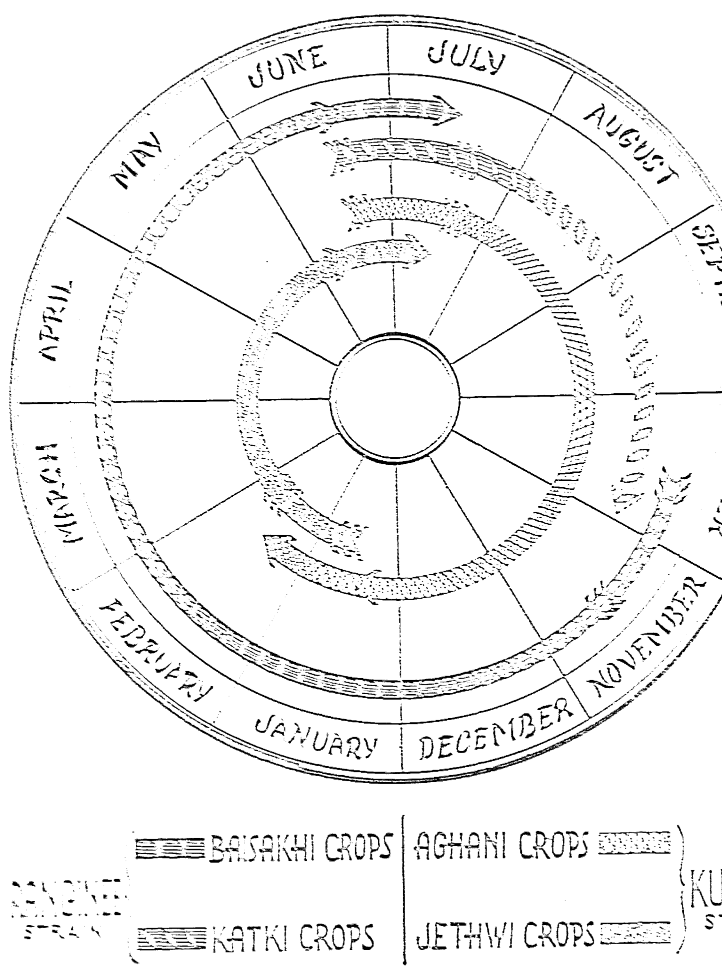
Sometime before the young ones emerge, the crop is usually harvested by cutting down lac-bearing branches. Those bearing healthy encrustration with gravid females are termed broodlac. These are tied into bundles and the broodlac is used for infecting other trees for the next crop. The rest of the lac as well as the broodlac after the insects have completely emerged is usually scraped off the twigs and sold in the market as scraped lac or sticklac.

The sticklac is subjected to various processes of cleansing and refining, yielding commercial grades of seedlac, shellac and cotton lac. These go for the manufacture of gramophone records, paints and varnishes and are also used in electrical and numerous other industries in India and abroad. The lac-bearing branches of trees cut at the time of harvesting are used as fuel and if thorny, as in the case of *ber*, utilised for fencing the field by the farmer.

Generally speaking, there are two strains of lac commonly grown in India. These are called the *Rangeeni* and the *Kusumi* strains.

Each strain completes its life-cycle twice a year, but the durations of their life-cycles and the seasons of

The lac crop calendar



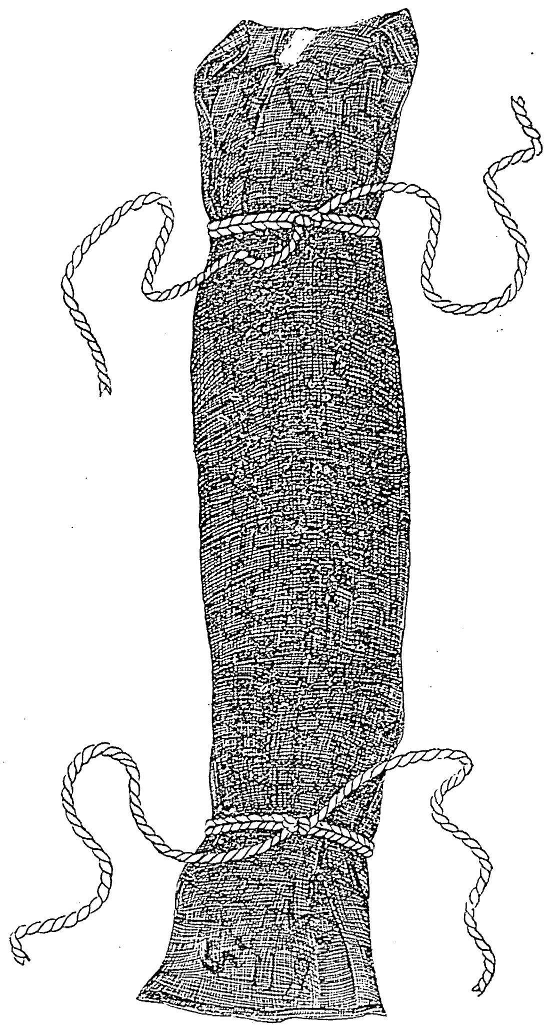
maturity when the crops are harvested differ considerably as seen below:

Strain of lac insect	Name of crop	Duration of life-cycle
Rangeeni	*Baisakhi*	October-November to June-July
	Katki	June-July to October-November
Kusumi	*Aghani*	June-July- to January-February
	Jethwi	January-February to June-July

Another important difference between the *Kusumi* and the *Rangeeni* lacs is that the former is mostly grown on *kusum* (*Schleichera trijuga*) or on a few other plants on which only broodlac from *kusum* is used. The *Rangeeni* lac is grown on hosts other than *kusum* and the brood used for its propagation is neither from *kusum* nor from a progeny of the *kusumi* brood. The more common *Rangeeni* hosts are *palas* and *ber*, which are widely distributed throughout the country. The over-all production of *Rangeeni* lac is four to five times that of *Kusumi* because of the limited number and distribution of *kusum* trees. The *Kusumi* lac, however, sells at a higher price on account of the superior quality of its resin.

There are well over a hundred species of trees and shrubs on which lac insects have been recorded in India, but from the point of view of large scale production, only the following constitute important hosts in Northern India.

A sixty-mesh wire-net container (basket) containing broodlac used for infecting palas. *It traps the enemies of lac contained in the broodlac, while permitting a free exit to the lac larvae.*



A wire-gauze broodlac container (basket)

For the Rangeeni strain

Palas; *dhak* (*Butea monosperma* Lamk. Syn. *B. frondosa* Roxb.) : This host plant is common throughout the greater part of India and extends in the N.W. Himalayas as far as Jehlum, ascends the outer Himalayas to about 3,000 ft. and in the hills of southern India to 4,000 ft. It is the commonest lac host and may be utilized in most of the states where it is found.

Ber, *beri*; *kul* (*Zizyphus jujuba* Lamk.):—Extensively cultivated throughout India, it is one of the major hosts in most of the lac-growing tracts in the country. It is almost the only important host in Murshidabad and Malda districts of West Bengal and in Hoshiarpur district in the Punjab. In districts with severe summer heat, it would be advisable to use it in conjunction with other lac hosts such as *palas* and *Ficus* sp.

Ghont; *kat-ber* (*Zizyphus xylopyra* Willd.) :—It is fairly widely distributed in India, being found in N.W. India, Rajasthan, Uttar Pradesh especially Oudh, Madhya Pradesh and the Western Peninsula from the Konkan southwards. It is an important lac host in Madhya Pra-

Bush cultivation of lac on Flemingia congesta

desh, and has also been successfully employed in parts of Uttar Pradesh and the Punjab. In Chota Nagpur, lac settlements on this host usually result in a failure.

Arhar; *mirimah*; *garomah* (*Cajanus cajan* Linn. Syn. *C. indicus* Sprong) : Extensively cultivated throughout India, it is an important lac host in Assam, particularly in Nowgong, where it is grown as a biennial or triennial crop. In the plains where it is usually an annual crop it would be futile to use it as lac host but improved varieties which would show better growth and longer life in the plains would undoubtedly be worth trying.

Galwang (*Albizzia lucida* Benth.): It is distributed in the Sub-Himalayan tract from Nepal eastwards, eastern Himalayan valleys up to 2,000 ft., Assam and Chittagong. It is an important lac host in Assam and has given good results in Chota Nagpur also. Often planted outside the natural region, it has been known to grow well in several places in northern India and may be planted for lac cultivation in most places.

Porho (*Ficus cunia* Ham. Syn. *F. conglomerata* Roxb.) : Found throughout the greater part of India, it is common, particularly on the side of ravines. The brood is easily preserved on this host in summer and the yield as well as lac encrustations are satisfactory. Utilized for lac-growing in Chota Nagpur and Assam, it is a host of potential importance for other places also.

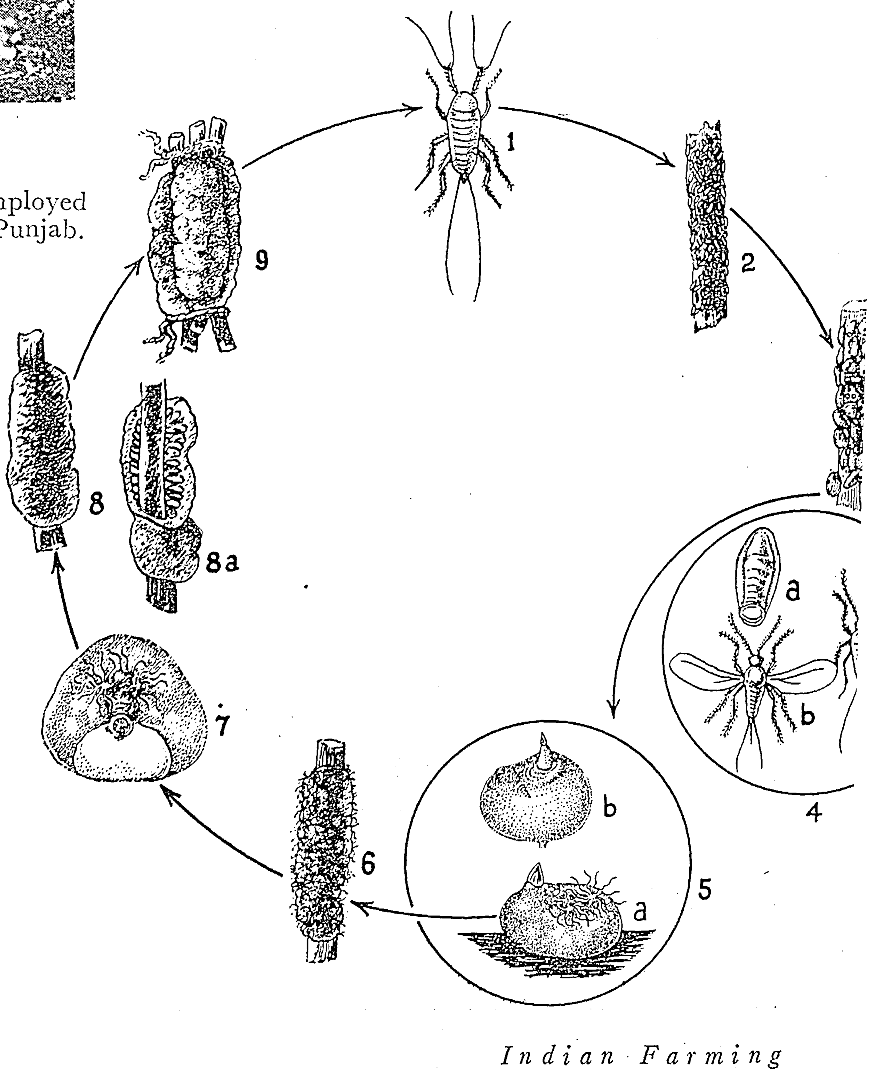
Barh (*F. bengalensis* Linn.) and *Peepal* (*F. religiosa* Linn.) : These occur all over India and are valuable hosts in the hotter parts of the country for their ability to successfully carry the brood through the hot summer.

For Kusumi strain

Kusum (*Sehliechera trijuga* Willd.) This is found in the dry forests of the Sub-Himalayan tract from Sutlej eastwards throughout the central and

LIFE - CYCLE OF THE LAC INSECT

1. *The lac larva*
2. *A settlement of young larvae*
3. *Male and female cells at the time of male emergence*
4. *a-male cell b-winged male c-wingless male*
5. *a-female cell b-female lac insect*
6. *Lac encrustation some time after male emergence*
7. *A female cell showing yellow spot*
8. *A lac-bearing stick with part of encrustation removed (8a)*
9. *Broodlac sticks tied together*



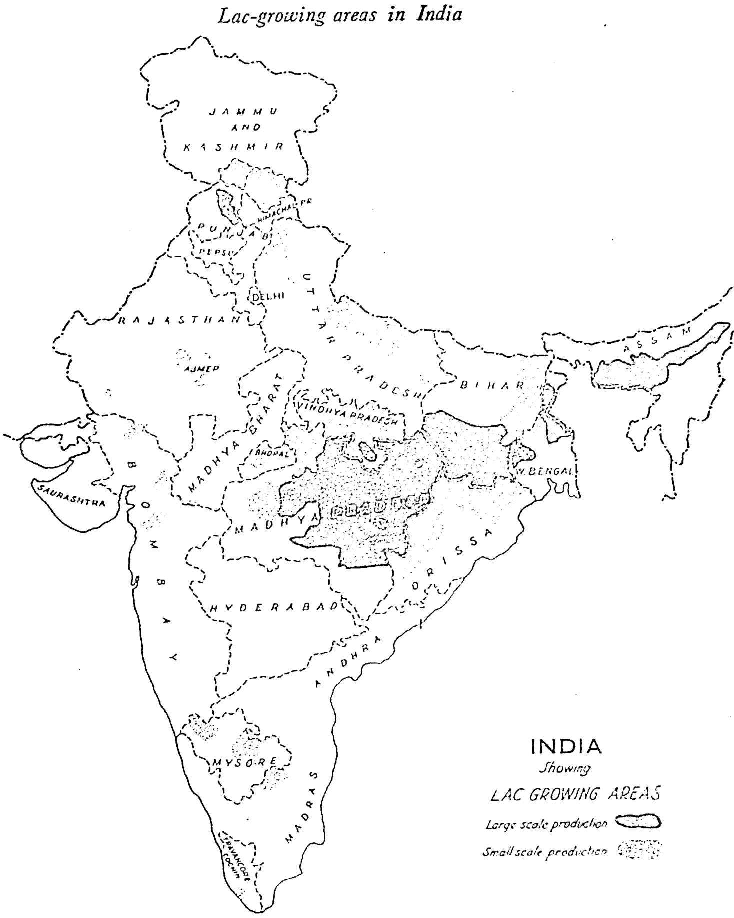
southern India. It is a very important host as almost the entire *Kusumi* lac is obtained from it in Chota Nagpur, Madhya Pradesh, Orissa and parts of Mysore and Madras.

Khair (*Acacia catechu* Willd.) : Common in most parts of India, this host has been used successfully in temperate districts of Chota Nagpur for carrying the *Aghani* crop only. As it cannot carry the *Jethwi* crop successfully because it remains leafless for a considerable period during the summer, it is important that it should occur in company with *kusum* which may be utilized for the *Jethwi* crop.

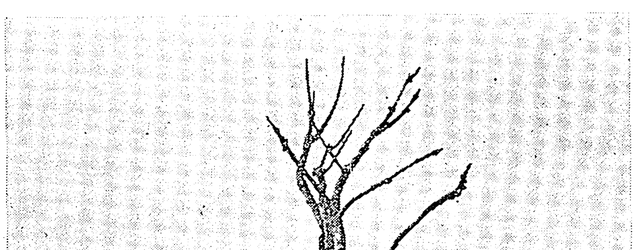
Ber; *beri, kul* (*Zizyphus jujuba* Lamk.) : In the event of favourable seasons when excess of broodlac has been produced, the cultivators in Chota Nagpur utilize the brood by infecting it on *ber* which yields a satisfactory crop for a season or so. However, it is generally advised that *ber* should not be brought under a *Kusumi* crop except under the fore-mentioned circumstances.

Since different hosts react differently to weather conditions, the broodlac survives better on some species than on others. This is especially true of hosts usually

Lac-growing areas in India



A palas *tree being cropped and the lac-bearing sticks being collected in a basket*



employed for the *Rangeeni* strain and the years of a very hot summer. In order to ensure a steady supply of broodlac it is advisable to have a larger variety of trees under lac than to restrict cultivation on one kind of host because if the latter gets adversely affected during a particular summer, a widespread shortage of broodlac may occur. Such a situation periodically arises in Murshidabad and Malda districts of West Bengal where *ber* is practically the only species put under lac.

A plant under lac suffers from the drain upon its sap caused by the millions of lac insects settled on its branches. As the branches are cut at the time of cropping, the plant receives a further set-back. Hence if the same tree is continuously kept under lac, its vitality would suffer and the resulting crops would become poorer in the succeeding seasons. For this reason it is important that such plants should be given periodic rest between cropping and the next infection. This may be achieved by dividing the available number of lac hosts into blocks or coupes, the size and number of which would depend upon the kind of plants or trees and the nature of the strain of the lac insect employed. Each coupe is then brought under lac periodically.

A *kusum* tree being slow-growing, may normally be brought under lac after an interval of $1\frac{1}{2}$ years, during which period it is able to put forth suitable shoots in sufficient numbers for yielding a satisfactory crop. As the crop lasts for about six months, the *kusum* trees are divided equally into four coupes. Each coupe would thus yield a crop after every two years.

A woman carrying cropped lac-bearing sticks collected in a basket

In the case of *palas* and *ber* and most other *Rangeeni* hosts the total number of trees are divided into three coupes in the ratio of 1 :3 :3. The smaller coupe, which may be located more centrally for convenience of operations, is employed for growing the *Katki* crop only. It is infected each year in June-July and croped in October-November, depending upon the locality. The other two coupes are utilized for growing the *Baisakhi* crop, only one of these being put under lac in each alternate year.

A *Baisakhi* coupe is infected in October-November and the crop matures in the following June-July, i.e., after about nine months. From these coupes the crop is usually partially harvested : shoots that are covered with dead lac (often caused by excessive heat) and shoots that are encrusted with living lac insects are cut and removed from the trees, and the sparse settlements of insects on the rest of the shoots allowed to remain as such. Swarming of the lac larvae would then take place *in situ* and result in a small *Katki* crop. The dead lac referred to above is scraped and the sticks with good encrustations of living lac insects are used as broodlac for infecting the *Katki* coupe.

However, in localities where the summer is excessively hot or of long duration, instead of the three coupes mentioned above only two coupes having equal number of trees may be had. Each year a coupe may be used alternately to grow the *Baisakhi* crop by artificial and the *Katki* by self-infection.

Lac insects do not thrive on old and woody shoots and if a tree has large proportion of such shoots, it would be necessary to prune it at a certain period before it is infected with lac. Judicious pruning of a tree would induce the growth of suitable number and size of shoots. If pruning is done at proper intervals it would also help in maintaining the general health and growth of the trees.

The time of pruning for different crops in the case of the common hosts is given below. Since local conditions exercise considerable influence on the growth of a tree, it may be found necessary, after some experience, to modify these timings to suit a particular locality. Cropping of a tree at the time of harvesting lac could also serve the purpose of pruning provided the trees are able to produce sufficient number of infectable shoots by the next infection. In the case of *kusum* and certain *Ficus* species, cropping usually serves the purpose of pruning.

Host trees	**Crop for which pruning is done**	**Approximate time of pruning**
Palas	*Katki*	Early to mid-February
,,	*Baisakhi*	Early to mid-April
Ber	*Katki*	Early to mid-February
,,	*Baisakhi*	Early to mid-April
Kusum	*Aghani*	January-February ($1\frac{1}{2}$ years prior to infection)
,,	*Jethwi*	June-July ($1\frac{1}{2}$ years prior to infection)

While pruning or cropping a tree, it would be found helpful to bear in mind the following points. The overall consideration should be that the general health of the tree must be maintained and its frame allowed to increase as far as possible. All the dead and diseased branches should be carefully cut off. Cutting of other branches too should be done in such a way as to maintain a good shape of the crown and to allow plenty of room for the growth of new shoots.

Branches over two inches in diameter should not be cut, though generally good results are obtained by cutting at the thickness of $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches. Thicker branches may, however, be cut in case of old trees when it is desired to produce new shoots at the expense of the old or to keep the frame of the tree within reach for convenience of operations. Shoots under $\frac{3}{4}$ inch should be flush cut at their base, i.e., close to the branch from which they arise. In all cases the cuts should be neat and should cause the least injury to the bark. This could be more easily attained if the implements used are sharp.

When pruning or cropping trees which have previously been pruned or cropped, the cuts should be made on the new wood resulting from the last pruning or cropping. The new shoots may be cut at a length of $1\frac{1}{2}$ feet from the point of its growth, provided it is of a satisfactory thickness. This practice will allow a steady increase in the frame

of the tree. Where the hand cannot reach for cutting a branch at the desired place, a standard tree pruner may be used. A secateur (roll-cut type) would be found convenient for cutting thinner shoots while a country *dauly* (crooked knife) would be useful for cutting thicker shoots or dead stumps.

The method by which the lac insects are introduced on to a host plant is called infection or inoculalation. The plants to be infected should possess sufficient numbers of infectable shoots and a cultivator must exercise his own judgement in leaving a tree uninfected, if in spite of earlier pruning, there is an insufficient number of shoots and if the shoots are of poor growth.

The quality of broodlac to be used in infection is of prime importance. Broodlac should be cut off the tree at the proper time, i.e., some time before the swarming of larvae is due to take place. This could be recognized visually by the appearance of a yellow spot on the crown portion of a healthy lac cell. The broodlac should contain mostly healthy gravid females and fairly good lac encrustations, and should be free from any conspicuous signs of attack by the predatory enemies like *Eublemma amabilis* Moor or *Nolcocera pulverea* Meyrick.

The caterpillars of these moths tunnel through and eat away the lac encrustations as well as the lac insects, causing considerable damage to the crop. The

A kusum *branch bearing lac encrustations. Best quality lac is produced on* kusum

former build galleries and domes with silk and roundish discs (its excreta) while the latter can be recognized by irregular web studded with small bits of excreta.

There are several other insects, like small wasps which are enemies of lac or of lac predators and are commonly found in most lac-growing areas. Where possible, and especially in areas where cultivation is being extended or introduced for the first time, 60-mesh wire-baskets, $2\frac{3}{4}$ inches wide and $11\frac{3}{4}$ inches long may be used as broodlac containers for infection purposes. These would permit a free exit to the lac larvae and trap the enemy and other insects associated with lac, and thus help in a better growth of lac crop in the beginning of the extension work.

Ordinarily, however, broodlac is not put in baskets but is tied in small bundles and infected on the trees by tying them along the longitudinal axis of the branches bearing infectable shoots.

The quantity of broodlac required by a tree would depend upon the kind of tree and the size and number of infectable branches present on it. A medium sized *palas* or *ber* tree may require about a seer of broodlac while a *kusum* tree would need double that quantity. Over-infection should be avoided by carefully watching the progress of swarming and settlement of lac larvae.

In order to have a uniform infection on a tree, it may be necessary to transfer brood bundles during the course of infection from one branch to another or from one tree to another. When the emergence of larvae is nearly over, the broodlac should be promptly removed; usually a period of three weeks would be found enough for the purpose of infection.

The enemies of lac insects emerge in larger proportions as the emergence of lac larvae comes to an end. The leaving of broodlac on trees after the emergence of lac larvae is over would encourage the spread of lac enemies to the detriment of the lac crop.

Self-infection or natural infection of a tree (i.e., instead of removing mature lac from the tree, part or whole of it is allowed to remain on the tree to swarm there) should for that reason be avoided except where absolutely necessary.

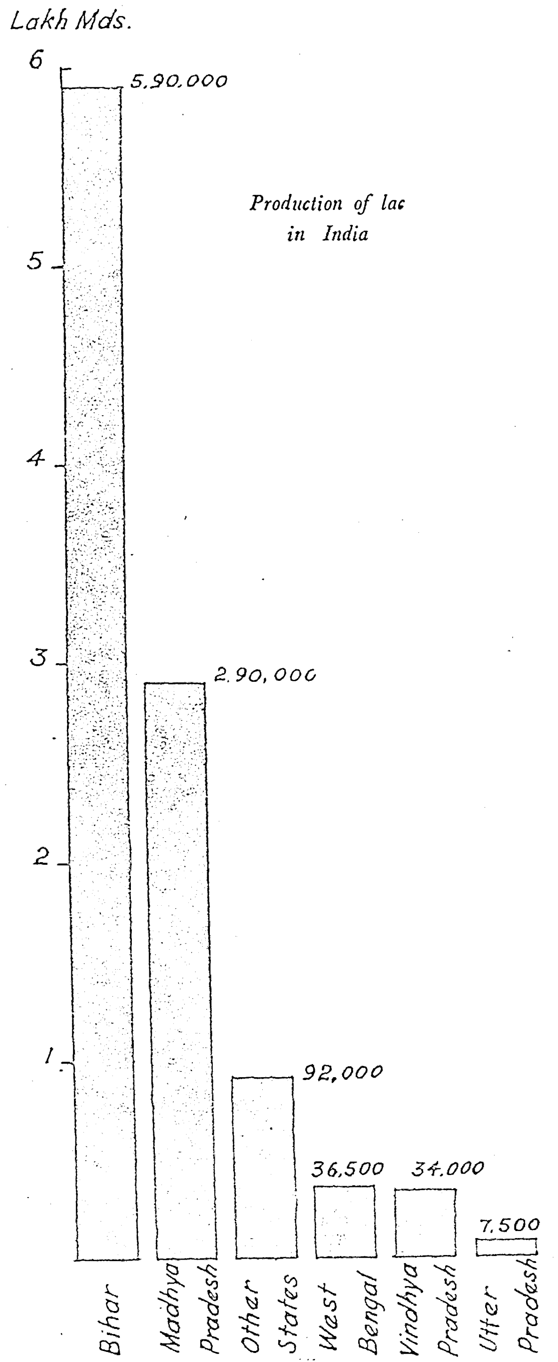
The foregoing remarks on couping, pruning, etc., apply mainly to lac cultivation on such hosts as would generally grow into trees. But lac is also cultivated on certain other plants and bushes, mostly in Assam.

In Nowgong, *arhar* seeds are sown in March-April and the resulting plants inoculated in October-November. In May-June, lac encrustations are broken or removed with hands from the healthiest plants leaving sufficient amount for self-infection. Plants with poorer growth are generally uprooted. The next crop is harvested in October-November and a similar procedure followed. The final or the third crop is taken in the following May-June.

Grewia multiflora, *Leea robusta*, *L. cripa* and *Flemingia congesta*, all of which grow into shrubs or bushes, are used mostly for growing the *Katki* (*Kairian*) crop with brood from *arhar* or *Ficus* species and yield heavily under local conditions. Annual shoots from a perennial stock are again utilized for the same purpose.

Mention may also be made of the preliminary trials to grow *Albizzia lucida* in the form of a bush in small beds which were well-manured and watered at Namkum. The growth of shoots was rapid and the plants were infected after they were about 1½ years old in the month of October. The resulting *Baisakhi* crop was very satisfactory in yield of scraped lac as well as of broodlac. As this species retains a fairly dense foliage during the severe summer months, the broodlac was better preserved on it than was the case on *palas* or *ber*. The *lucida* plants coppice well and throw out sufficient number of shoots which could be infected after a suitable interval.

Much harm is done to lac crops by the practice of harvesting them prematurely. This practice, commonly called *ari*-cutting, is unfortunately widely prevalent

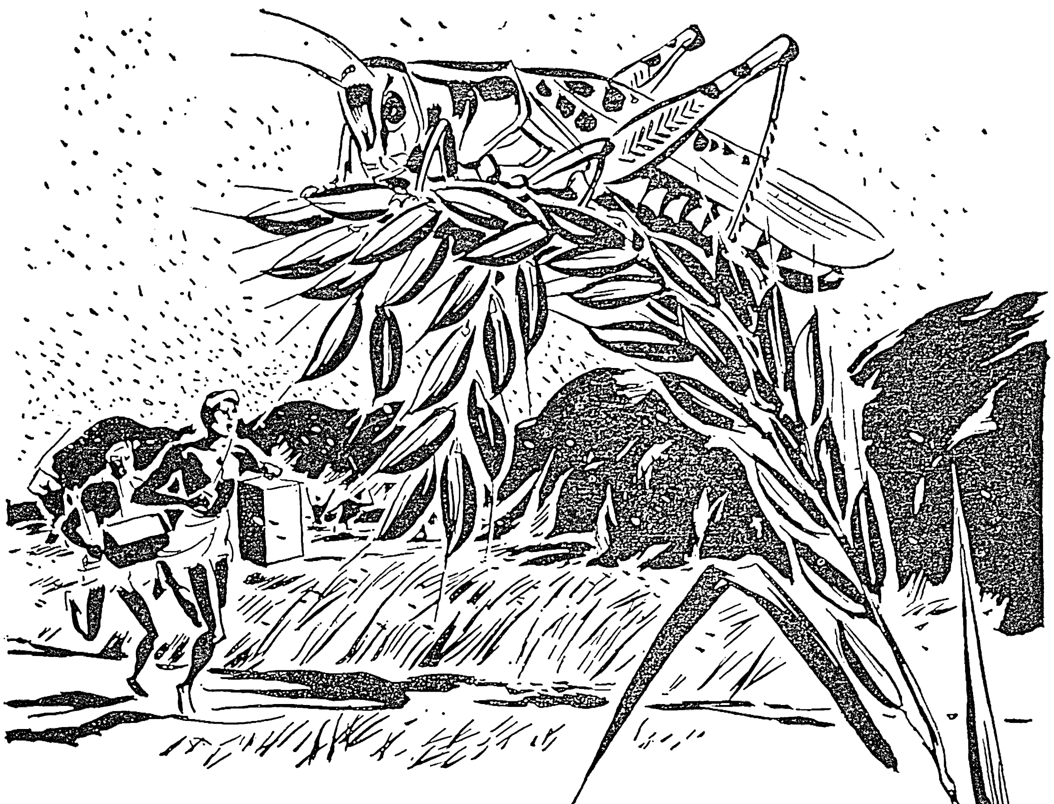


for the *Baisakhi* crop. While there may be no objection to the removal of branches bearing dead encrustations of lac in April or a little later, the removal of branches with immature living insects at this time will not only reduce the overall yield of sticklac, but often result in shortage of broodlac in June-July which, as far as possible, should be regarded as the right time for harvesting the *Baisakhi* crop. The same remarks apply to the other crops also which should be cut when the insects are mature.

Broodlac sells at a much higher rate, and every cultivator should attempt to sell as much of it as possible and hesitate to cut *ari*-lac. Care should, however, be exercised not to cut the broodlac long before or after the emergence of lac larvae. The visual method for determining the right time for cutting the broodlac is quite helpful. As the time of maturity approaches one might look for the yellow spot that appears on the lac cell near the anal pore. The appearance of the yellow spot is caused by the fact that as the female approaches maturity its body contracts near the anal region and vacates a portion of the cell causing it to look yellow (eggs are laid in this part of the cell). When the yellow spot occupies nearly one-fifth to one-fourth of the crown or top area of the cell, the lac should be cut, for within about five days from this time the emergence of young ones will begin. Within these days, the broodlac may be sold or despatched to outside stations.

The transport of broodlac also deserves a special mention. As far as possible, strong bamboo baskets, preferably round, with a capacity to hold 15 to 20 seers of broodlac, should be employed. The lid should also be made of bamboo. Broodlac should not be despatched or kept in gunny bags as the heat generated by the insects is likely to make the inside atmosphere stuffy, induce growth of moulds and kill most of the gravid females as well as the larvae. For air-transport, however, rectangular bamboo baskets strengthened by light wooden batton frame, 2 feet × 1½ feet × 1 foot, should be found more satisfactory.

Scraping of lac off the twigs can be commenced immediately after cropping; while doing so care should be taken to kill all the pupae and caterpillars of moth enemies. The scraped or sticklac obtained from a crop should be spread thinly in a shaded and well-ventilated place, as otherwise, moisture and heat from the insects themselves would induce fungus growth and permit blocking of lac, conditions which will reduce the value of the commodity in the market. Bits of wood and other admixtures should be removed. Storage of lac for long would reduce its quality and might, if proper precautions are not taken, invite attack from pests. The cleared scraped lac should be marketed as early as possible.

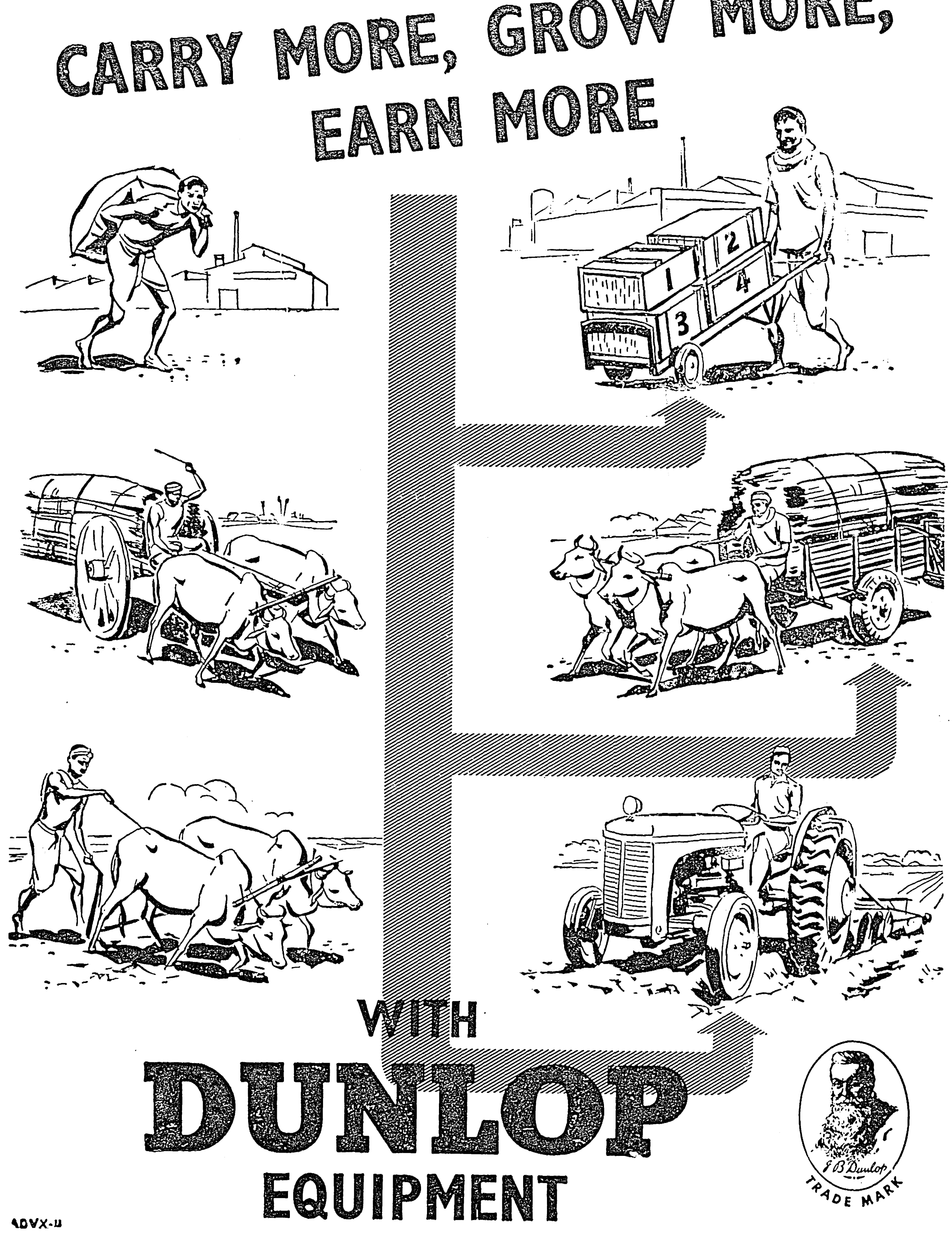


National Printing Works, Delhi, India.

Regd. No. D. 571

Indian Farming

SEPTEMBER 1954


CARRY MORE, GROW MORE,
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Indian Farming

VOL. IV SEPTEMBER 1954 No. 6

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Annas 12 per copy   Rs. 9 for 12 issues   Rs. 4-8 for 6 issues

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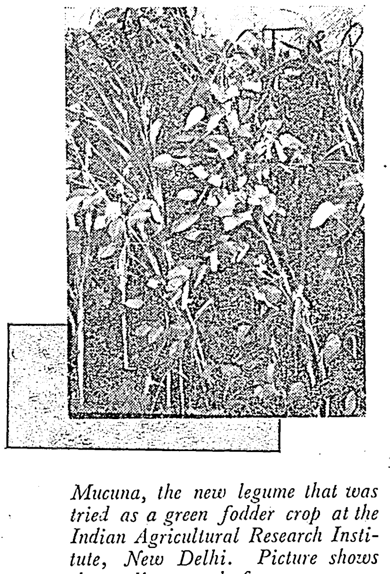
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

NEW DELHI

PLANT PROTECTION

PRODUCTIVE FARMING requires that adequate attention be paid to the protection of crops from the depredations of wild animals, pests and diseases of various kinds. It is common experience that the farmer does not reap the benefit of the toil he puts in in crop husbandry fully due to the 'untaken harvests.' In fact, the loss caused to the nation's agricultural income every year amounts to a colossal figure. What this means to a nation hard-pressed to make production meet demand can easily be imagined. With the stress these days on intensified farming, the problem of plant protection assumes new importance. In the case of the coconut, for example, it is estimated that the leaf-rot disease alone, which is widely prevalent in Travancore-Cochin, is responsible for a reduction of anything between 10 and 80 per cent in the yield. There was a time, of course, when the farmer used to helplessly witness the devastation caused to his crop by pest or disease. But the farmer of today is in a much happier position because of the vast amount of research that has been done in the field of plant protection in the last many years. A number of chemicals are now available to him which make fighting diseases and pests easier, cheaper and effective. The Extension system is also working on a better footing and newer methods of plant protection are more quickly conveyed from the laboratory to the field and the necessary chemicals made available to farmers in sufficient quantities and in time. However, apart from conveying information on the measures required to keep the crops safe from pests and diseases to the farmers scattered over the vast country, another aspect of this all important work requires to be stressed. Plant protection work, if it has to be successful, requires vigilance and immediate action on the part not of one farmer or two in the village but the entire farming community. The adoption of control measures to safeguard crops against pests and diseases, however efficiently done by a few enlightened farmers, will bring no effective results if the rest in the village are indifferent to the work. As in other fields of rural development and better farming, the keen sense of co-operation on the part of every farmer is what is needed to reduce pest or disease damage to the minimum. Community action in this regard will also solve such other problems in plant protection as the procurement and distribution of chemicals and the apparatus needed, and assure timely action on all the farms in the village whenever a pest or disease makes its appearance. A healthy crop not only means more food for the people or more raw material for the industries but also more money for the farmer. As such, fighting pests and diseases is a work of national importance calling forth concerted action on the part of the entire farming community.

OUR COVER



Mucuna, the new legume that was tried as a green fodder crop at the Indian Agricultural Research Institute, New Delhi. Picture shows the excellent stand of mucuna grown mixed with maize. For further details about this new fodder crop *see article on page 16*

Farmers I Have Met

HE LIVES WITH PLANTS

"NURSERY-KEEPING is a paying profession provided you can understand the 'language' of the plants to give them proper care", said Shri Babu Ram, a 25-year old nursery-keeper of New Delhi, to me when I met him about a month back. I was a bit puzzled by this statement at first, but as I talked further to the youngman I could easily guess what he really meant.

Shri Babu Ram was initiated into the art of nursery-keeping by this father at an early age of 16, and given intensive "schooling" for about six years. The boy picked up the art very well, so much so that for the last three years he has been managing the nursery known as "Chimmanlal & Sons" independently and in a creditable manner.

Shri Babu Ram, who grows all varieties of fruit, flower and vegetable plants, lives in the nursery all the 24 hours of the day. He attends to the needs of the plants himself with the assistance of one servant. As he puts it, "I have to look after so many families that I hardly have any time to do anything else. On top of it, my 'wards' cannot speak; so I have to judge their requirements myself and satisfy these at the proper time. This keeps them living, happy and cheerful, as you can yourself see from these smiling flowers around here."

Shri Babu Ram further told me that he took special care to protect the plants from the intense tropical heat to prevent them from withering away prematurely. For this he uses leaf-compost mixed with a little sand, as, according to him, it keeps the plants cool and refreshed. Besides, "it is always good to use leaf-compost for manuring the plants as unlike cow-dung compost, it saves the plants from mite and other insect-attacks." He added proudly that so far no outbreak of pests had occurred in his nursery and he had not spent a pie on any kind of insecticide.

Shri Babu Ram carries an old head on young shoulders and discusses all aspects of nursery-keeping with confidence. He has not betrayed the confidence placed in him by his father three years ago when the latter entrusted a well-established nursery with a sizable clientele to the independent care of young Babu.

—H.K.S.

Man of the Month

Shri Yashwantrao Sawant

"DO you think that a farmer can upgrade sugarcane production and maintain it at an economic level without investing heavily on the crop ?" was the question I posed to the District Agricultural Officer of the Poona district in Bombay State in June last.

He wrote back: "This is not just a possibility. Many farmers are already doing it. I could name a dozen of them off-hand. If you want to meet one of them and get the answer for your question straight from him, I would suggest Shri Yashwantrao Sawant of Koregaonmul near here."

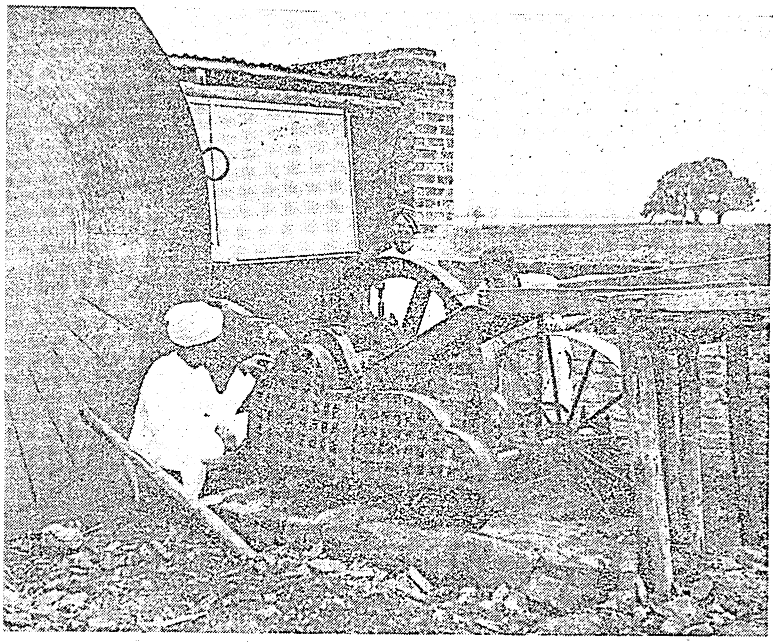
This is how I met Yashwantrao Bajirao Sawant at his farm-home in Koregaonmul, 17 miles from Poona on the Poona-Sholapur Road. With him was his educated son Narsing who is helping his father, along with his two brothers, manage the 125-acre farm.

As we went round the farm, I was struck with the neatly laid out bunds and irrigation channels through which water was flowing to the sugarcane and vegetable fields.

The Farmer WHO HAS "NOTHING TO GRUMBLE" ABOUT SUGARCANE

by
M. G. Kamath

Farmer Yashwantrao Sawant supervises the irrigation of his sugarcane crop. Personal supervision, he says, pays dividends in agriculture



One of the two Kirloskar crushers on the Sawant farm. Father and son checking up the crusher before the gur-making season starts

Yashwantrao is the fifth generation of Sawants living and farming on this holding. Till five years ago, the farmer told me, he was doing what his forefathers did before him—farming the traditional way. It was about five years ago that he realised that it was time he thought of getting science help better land use, and sought the help of the Agricultural Department.

I asked Yashwantrao what improved measures advocated by the Agricultural Department he was adopting.

"Quite a number of them," he said. "To mention the most important ones, I have been using improved seeds for all crops including potatoes ; I have been relying on the use of oil-cakes, manure mixture, ammonium sulphate and the special potato mixture for raising better crops on the farm ; compost-making, taught to me just a few years ago, has solved to a large part the procurement of enough organic manures for the various crops I raise here. Spraying and dusting for insect pests and diseases as shown to me by the Agricultural Officer has been a boon to me."

" Not to mention the mould-board ploughs, the power-driven cane crushers and the oil pumps installed on our wells," added Narsing, obviously the one more interested in the mechanical aspect of farming. A jeep and trailer were doing a lot of work for Narsing and his father in transporting farm requisites and farm produce.

Yashwantrao's farm extends to an area of 125 acres—a medium black and not too deep soil. With seven wells and just about seven to eight inches of rain in the last few years, he has been able to irrigate 70 acres of the farm. I admired Yashwantrao for the ingenious way in which he was managing these acres. He had split this acreage into four blocks putting three of his sons incharge of three blocks (the fourth onc is in the College), and his brother in charge of fourth. While each one was responsible for all the operations on his own block, the farmer would take a round each day of all the blocks and discuss the problems that each one would have and suggest a way out for them. " This method ", he said, " is working very fine indeed. It gives each of my managers the responsibility and training desired to bring out the maximum out of land."

Of the crops grown, sugarcane occupied 25 acres. On the rest of the land such crops as *bajra*, *jowar*, gram, chillies, potatoes, vegetables, wheat, peas and paddy were raised. A two-acre plot was reserved for raising paddy for home use and a ten-acre orchard was devoted to the growing of lemons.

Narsing and father discuss a problem. The system of management in blocks, according to Sawant, has made his work lighter while giving the requisite responsibility and training to the four managers

I saw the sugarcane fields lush with second and third year ratoons the farmer was raising and asked him the question that was topmost in my mind.

"Tell me," I said, "how do you raise sugarcane the economic way?" The farmer began: "I plant cane from November to January. By way of preparatory cultivation, I give the field three ploughings with Kirloskar No. 9 plough (a heavy plough) with an interval of 15 days between two. Then I manure the field with farmyard manure or compost at 60 to 80 cartloads per acre."

"Have you tried raising green manures?" I interrupted.

"Yes", he replied. "In fact, when ratooning is not done, I get about six acres of land for raising sannhemp which I utilise for green manuring sugarcane. When I am short of farmyard manure I also try sheep penning. I put 500 goats or sheep in two *gunthas* for two nights. I get about 200 cartloads of compost on my farm. I resort to cattle penning also when I find manure shortage.

"To continue, I give one more ploughing after the application of bulky manures to the field, then plank it to crush clods; then I make the furrows, again with Kirloskar No. 9, 13 inches deep and about three feet apart.

"For planting I use $1\frac{1}{2}$ ft. long sets and with three buds on each."

"What about seed treatment?" I said.

"I used to do that once", was his rejoinder, "but we are now lucky in not having any diseases in recent years. As such I have not been treating the seed before sowing."

VARIETY USED

"What is the variety you like most?" I asked.

"Till 1935", he replied, "we did not grow any variety excepting the local *Pundya*. Then Co. 419 was introduced to us. It was better than *Pundya* in general yield as well as quality and in the keeping quality of the *gur* prepared from it. But since the last two years we have been using Co. 475 as recommended by the Agricultural Department. This variety has become very popular in this area and has practically replaced Co. 475."

"You think you have done well in substituting Co. 475 for Co. 419?" I asked.

"So far", said the farmer, "Co. 419 has given us a good performance. Co. 419 is a class of its own. It requires less of irrigation water and can stand droughty conditions somewhat. Co. 475 takes more water, lodges to a greater extent and, they say, is susceptible to disease, but if it is free of red rot, it produces thicker canes and gives more yield. I certainly fancy Co. 475," he said.

"Do you think that growing a sugarcane variety year after year from the farm seed leads to a deterioration in yield?" was my next question.

"That is what my experience is", he said "and to get over that I have been always getting some fresh seed from the Padegaon Sugarcane Station and multiplying it here so that I may keep up the freshness of the seed material. I believe every sugarcane farmer should do that as a step towards maintaining pretty good yields."

After the planting of the cane is over, he converts the ridges and furrows into beds of 12 ft. × 12 ft. to facilitate irrigation.

"What about artificials? Don't you apply any artificials at planting time?" I asked.

"No," he said, "I do not fertilize at planting time, but I give 100 lb. of nitrogen in the form of ammonium sulphate two months after planting and another dose of 100 lb. of nitrogen in the form of oil-cake after two months and earth up the crop." The maximum dose of nitrogen prescribed by the State Department is 300 lb. for the crop.

The crop gets three weedings in all up to June, and irrigation once in ten days in winter and once a week in summer, bringing the total to 35.

HIGH YIELD

With this attention to the crop and the personal supervision of farmer Yashwantrao, a constant yield of about 60 tons per acre was being obtained by him.

"What do you think are the more important factors that lead to good cane production?" I put in.

"Water and manure", was his quick rejoinder. "If I had the benefit of canal water, I am confident I would double the yields. Just now I have to confine my acreage under sugarcane to just 25 acres for want of enough water," he said.

"Talking of ratoons, what is your experience?" I asked.

"That brings us back to the varieties," he replied. "A Co. 419 ratoon, from my experience, is better than that of Co. 475, and again Co. 419 was giving me three ratoons while Co. 475 gives me only two." Raising a ratoon crop is less costly according to the farmer.

"After following the better way of cultivating sugarcane, how do you think you stand regarding yield?" I enquired.

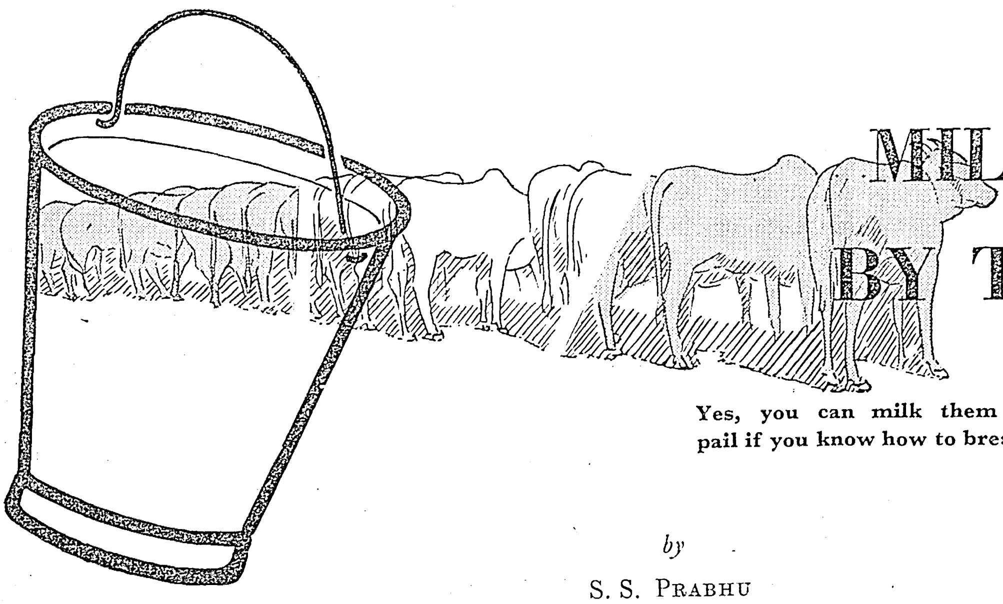
"Before I took up these improvements, my yield of cane was roundabout 40 tons to the acre. Now it is a constant 60 or thereabouts. Farmers here who are still to follow better methods are finding that to get anything more than 40 is an uphill task."

The farmer was converting cane into *gur* and marketing it. The power-crushers he had installed on the farm were of great help to him in reducing the cost of *gur* production.

SMALL DAIRY

I was wondering whether with such diversified crops and improved methods on the farm, the farmer would not also think of trying mixed farming here. To my question whether the farmer was also maintaining a dairy herd, he led me to the cattle sheds which were maintained very clean. Apart from the 24 work bullocks the farmer owned, he is also maintaining 12 cows and 12 she-buffaloes as a small dairy unit. He told me that he was able to maintain the herd without much trouble. Twenty-five acres on his farm had been maintained as pasture land for the grazing of the cows. He also showed me his excellent Gir breeding bull.

(*Continued on page 8*)



MILK THEM BY THE PAIL

Yes, you can milk them by the pail if you know how to breed them

by

S. S. PRABHU

JUST NOW, milking the cows by the pail is nowhere common in our country, in spite of the admittedly imposing numbers of cattle we have. In fact, our average milk-yield is one of the lowest among world averages. Actually, it works out to about 400 lb. per lactation of 300 days, as against 10 to 20 times this quantity for European cattle.

How do we step up milk production so as to meet the country's requirements without further increasing the cattle population? Some say the solution lies in proper feeding. Others hold that control of cattle diseases can do the trick.

Proper feeding and disease control can facilitate the free expression of the milk-producing trait of the cow, but they cannot bring out milk if it is not there. To maximise yields, it is necessary first to produce cows with high milk-yielding potentialities. In other words, we must breed for plenty of milk.

For adopting a sound breeding programme, one pre-requisite that has to be satisfied is the ready availability of standard breeds with satisfactory performances. Fortunately, we have in Sahiwal, Sindhi, Gir, Tharparkar, Ongole and others excellent breeds to transmit the high milk-yielding property to the low-yielding nondescript cattle that form the majority of our cattle population.

GRADING

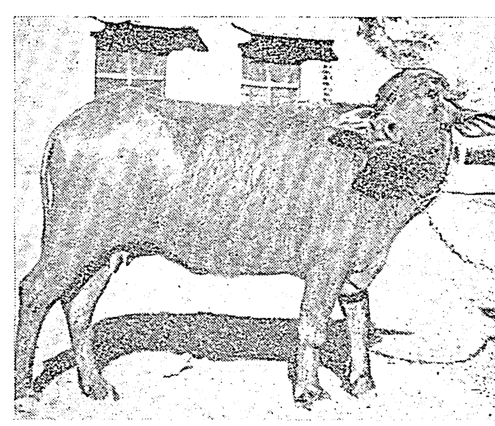
How then is breeding for milk done? One way is by grading the cattle. This is done by systematically replacing the low-milking capacity of the nondescript cattle stock by the higher milking qualities of the standard breeds. For this purpose, the nondescript cattle are crossed, generation after generation, by the bulls of the standard breeds. When this process has been followed for five or six generations, the resulting progeny approach in excellence the performance of the superior breed used in grading.

We have two cows, a mother and a daughter. The nondescript mother never gave more than two seers of milk per day at the peak of her lactation, while the daughter gave as much as eight seers of milk per day. The former has never been economic, while the latter is. What brought about the difference was that the daughter was born to a Sahiwal bull.

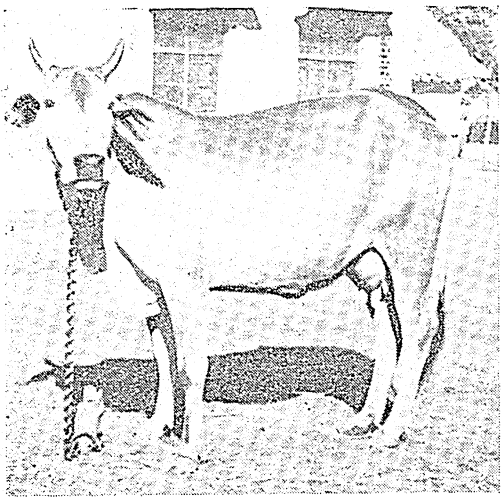
In a like manner, the daughter of a country she-buffalo born to a Murrah bull gave, in her very first lactation, three times the milk ever given in a day by the mother.

SELECTIVE BREEDING

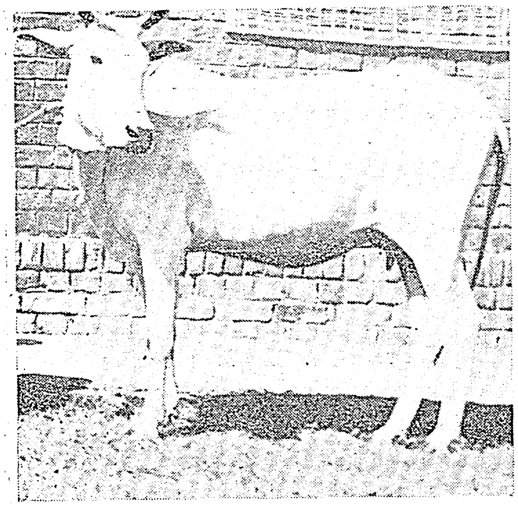
The other method of achieving the same result is by selective breeding. It means mating the best to the best. It is laborious and time-consuming. Both the bull and the cow have to be selected. It is not very easy to estimate the bull's worth, and a chance selection of a wrong bull may at times ruin years of patient and hard work. This kind of work, though it requires



The buffalo that gave three times the milk ever given by her nondescript mother, was born of a good Murrah bull



This is the mother that never gave more than two seers of milk per day



The daughter which gave eight seers of milk per day because of her being born of a Sahiwal bull

expert supervision, is nevertheless a safe process of improving standard cattle breeds.

It, therefore, looks as if the cattle situation at the present time can best be tackled by grading to begin with. Grading to be successful, however, requires that the standard breeds used be carefully selected. Again, for successful grading we have to ensure that the bulls of select breeds are available in sufficient numbers and at specified intervals over a period, say, of 25 years as the grading programme gets going and gathers momentum.

As the ceiling value of milk-production in graded stock increases, we will have to maintain and further improve that level. It will be necessary to produce bulls having the desired levels of transmitting abilities for milk. This can be done through selective breeding of the breeds selected.

Grading thus depends upon improvements in the selected breeds, and this is done through selective breeding. Grading, therefore, cannot be divorced from selective breeding, and to ensure a smooth execution of any grading programme, it will be necessary to multiply the number of farms keeping only pure stocks of the superior breeds.

At one time, the job of finding the large number of desired bulls for undertaking this type of breeding work would have sounded impossible. Today, thanks to the technique of artificial insemination, we no longer face such a situation.

(Continued from page 6)

" My idea is to build up a small Gir herd, " he said. And a look at the herd showed how good the results of his attempts in this direction were.

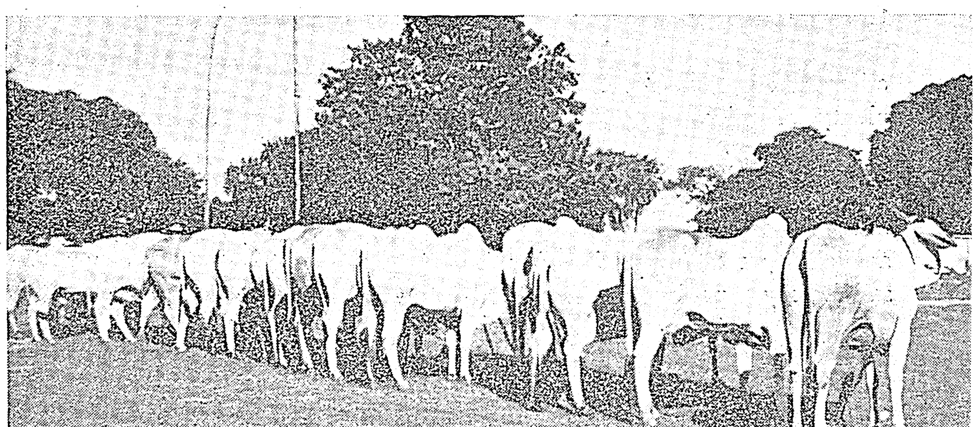
" Heard of the Japanese system of cultivating paddy ?" I asked.

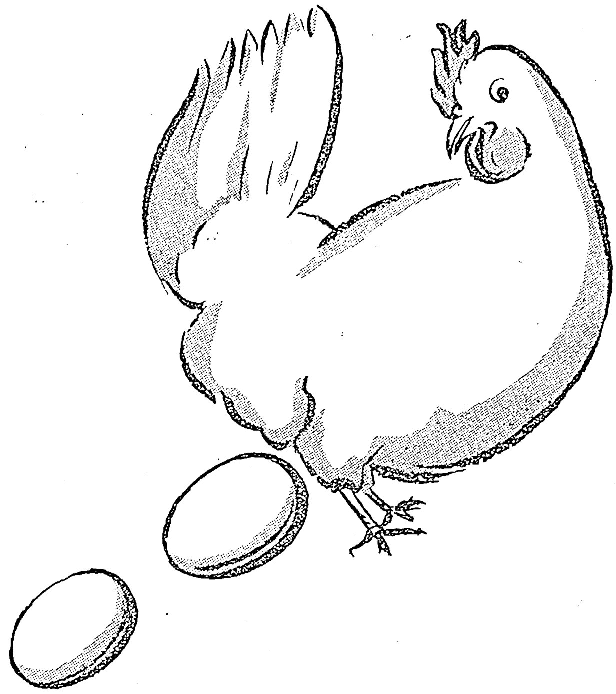
He smiled and said, " Heard of it ? I have not only tried it but am telling others now that they should adopt it. To tell you the truth, my trying the new system was nothing spectacular because I grow just two acres of paddy. But till last year, when I used to raise paddy in the usual way, my yield never used to exceed 40 maunds an acre. With the Japanese system, to my surprise, and to every body else's also, I got just twice my usual yield. Not only that. I was using 64 lb. of seed for my nursery per acre, but by the Japanese system I found that 15 lb. was ample."

As if to give a final and conclusive reply to the question that I had asked him when I met him at the farm gate, he said, " there are a number of farmers who are yet to adopt improved practices and get better returns for their labour. I have been growing sugarcane on these 25 good acres with these practices I have been telling you about, and have nothing to grumble about the yield. I wish other farmers also put in a little more effort in raising their cane yields."

As I thanked and left him, I saw him going back to the fields where water was being let in for his favourite crop of sugarcane to supervise the work so that the water could properly seep into the soil and nourish the crop, about which, as he had said, he had nothing to grumble.

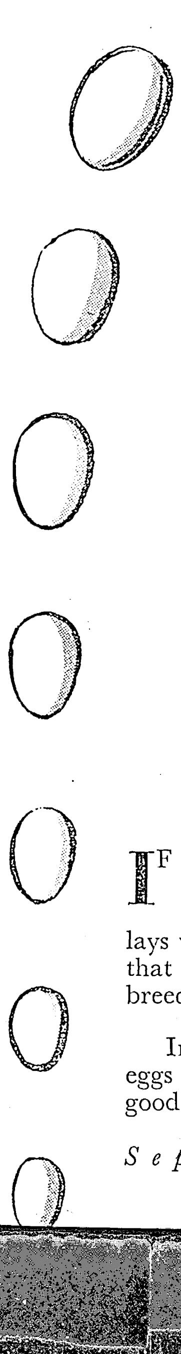
The herd of fine Hariana cows produced at Izatnagar. The herd was built up by selective breeding





A factor that can easily decide whether or not you get paid for all the troubles you take in poultry-keeping

are your birds good layers?



by

S. G. Iyer

IF you have a bird of a good strain and another of a poor strain, and give them both identical environmental conditions, you will find that the good strain lays very much better than the other, which only proves that egg-production is certainly associated with good breeds.

In Western countries, certain strains give 180 to 200 eggs on an average per bird in the very first year with good attention and on certain farms with a large number of birds an average of over 200 eggs per bird has been obtained.

Several factors determine egg-production. From the practical point of view, the earlier a pullet lays, the greater the financial gain. Again, the birds that begin laying early are generally very much better than those that begin laying late.

Good nutrition and proper management help early laying. The season also plays an important part on the laying time of the birds. Birds hatched from November to February or March begin producing at an earlier age than those hatched from March onwards. Birds hatched early in the season come into lay at a lighter body weight than late-hatched birds. This is no cause for alarm, because eventually these birds attain as big a body weight as late-hatched birds. However, during the first year, the egg-weight will be less than that of the late-hatched birds.

The date of hatching also affects the number of eggs laid in the first year. If hatched very early, such birds are apt to go into a complete or partial moult and so pause or rest for six to twelve weeks. The best production during the first year is obtained by hatching so that the birds come into production by about the end of September.

SEASONAL EFFECTS

The number of eggs laid per month is very much affected by the season. Birds normally lay most intensively during the spring months. However, in countries where the climate is equable during the whole year, there is much less variation in the rate of production.

A poor egg-layer may lay only one egg in two or three days or even a longer period. On the other hand, a good laying bird will lay the first egg fairly early in the morning and lay the next egg at the same time or a few minutes later next day and so on until she lays an egg fairly late in the evening. She will then miss a day and start the cycle all over again. In other words, good layers lay in long " clutches " with short intervals and poor layers in short "clutches" with numerous long or short pauses.

Birds that lay a large number of eggs during the winter months are on an average better layers than those that lay a few eggs during the period. Further,

birds hatched in January to March and coming into production from the end of September are better layers if they do not have what is called a winter pause.

BROODINESS

Prolonged periods of broodiness lower annual production. *Desi* fowls are very prone to broodiness and naturally the production will be very small, but by checking the broodiness the average annual egg-production can materially be improved. Light breeds such as Leghorns are as a class very much less subject to broodiness than heavy breeds. Persistently following a policy of selection for non-broody characters, makes it possible to have a flock which is relatively non-broody.

Poor layers stop laying early in the year and take a long time to come back into production, while good layers lay well into autumn or later and come back into production after a comparatively short rest. Termination of egg-production is intimately associated with the annual moult though sometimes there may be birds which continuously lay through the moult and others which do not moult even after a year's lay.

MOULTING

Late moulters are quick moulters and it is a good sign to see a large number of birds almost naked in the flock. Birds which moult slowly, dropping a few feathers at long intervals, are poor producers.

In most parts of India, hens moult during July-August and poultry-keepers get busy during these months to spot out the best layers for breeding them in the winter months so as to raise pullets which will lay in September or October next.

Birds as a rule moult five times from birth to maturity and after that once a year. The average layer undergoes moult towards the end of the first year of her production. A pullet may reveal a partial neck moult. This may not interfere with laying, because it is mostly caused by underfeeding.

The time and duration of the first annual moult help in identifying persistent layers at the end of the first year of laying. Under ideal conditions, a pullet lays for about eight months from the time she lays the first egg and occasionally longer which means persistent production. Good layers occasionally lay for over one and a half years before moulting. If the moult, therefore, starts late, it is a problem to get eggs from these birds until late in the breeding season.

Research Scheme shows new possibilities in insect control

JOWAR EAR BUG

can be put down with a single, cheap treatment

by

K.R. NAGARAJA RAO

RESULTS achieved under a special scheme jointly financed by the Indian Council of Agricultural Research and the Madras Government have shown that the earhead bug, *Calocoris angustatus*, of *jowar* (sorghum) can be successfully controlled by the application of BHC dust of five per cent concentration. The improvement in crop-yield thus effected would amount to about 30 per cent.

The pest which is widely distributed all over South India is one of the most serious pests of the *jowar* crop, capable of causing heavy losses. It seems to have been first reported in South Arcot in 1891, whereafter the depredations caused by it have been assuming increasing proportions. All earlier attempts to control the pest were of no avail.

LIFE-HISTORY AND HABITS

The adult is a small green bug, and is found in groups of hundreds on the tender and developing ear-heads. Generally, the female which produces up to 200 eggs, inserts the cigar-shaped eggs under the glumes or in the middle of the florets. The nymphs hatch out in five to seven days. In the beginning, they are orange red in colour, but turn greenish as they feed and grow. The entire life-cycle of the pest occupies about 15 to 17 days.

The bugs subsist on a few species of grasses during the off season. The pest, as an adult and a nymph, has also been recorded on the ear-heads of *ragi* (*Eleusine coracana* Gaertn), *tenai* (*Setaria italica* Beauv), *cumbu* (*Pennisetum typhoides* Stapf) and maize (*Zea mays*), though it is a very minor pest of these crops.

The initial infestation starts with the very emergence of ear-heads from the plants in about the beginning of May in the case of the irrigated summer crop and by November-December in the case of the dry crops. The pest multiplies at an incredibly terrific rate and within a very short period of about a fortnight, the ear-heads literally teem with hundreds of nymphs and adults. The pest is most active and destructive during the period when the tender grains start setting and developing into the milky stage. Both the adults and the nymphs suck and feed on the cell sap. The drain is often so heavy that the very development of the grain is hampered and the affected ear-head turns black in colour, with a sooty mould spreading on the honey dew secreted by the bugs.

CONTROL MEASURES

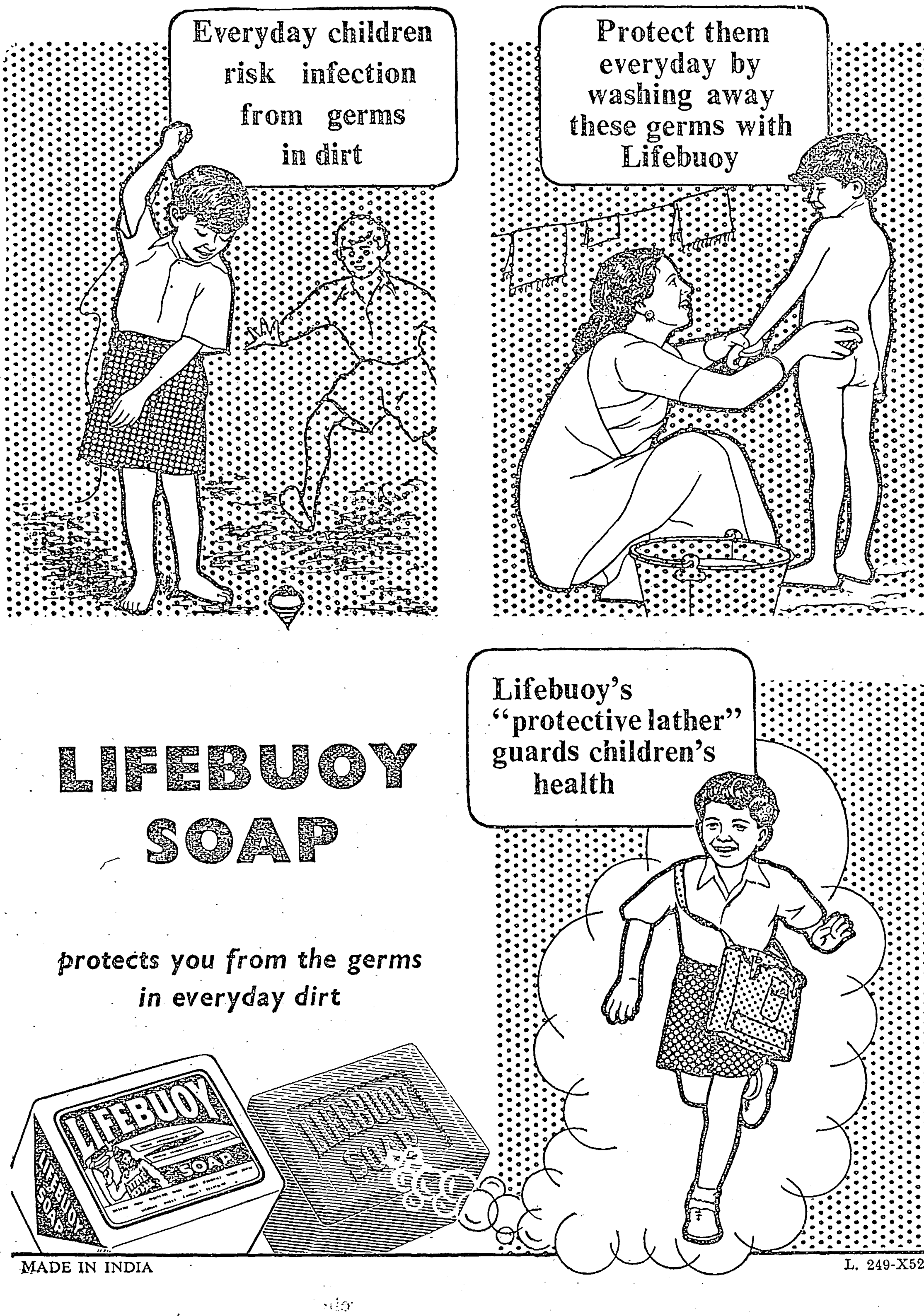
Earlier attempts to control the pest consisted of shaking the infested ear-heads over a tray of kerosenated water and hand-netting, but neither of these methods could control the bugs completely. Shifting the date of sowing a few days earlier, i.e., before the 15th March, was also tried and the method did afford some relief in the case of the irrigated crop in Coimbatore. This measure, however, has its own limitations in that it may not always be possible to make the field ready for early sowing of the summer crop. Regarding chemical control, sulphur dusting did not secure any relief and spraying of contact poisons proved impracticable.

HAND-MIXED DUSTS

Hand-mixed dusts of different concentrations of synthetic chemicals such as DDT and BHC were tried for the first time during 1946. The experiments were continued during the subsequent years, and both the chemicals at five per cent concentration were found useful in controlling the pest. But between the two, the lethal effects of BHC were more immediate and spectacular, since the entire insect population was exterminated in the course of about six hours while the action of DDT was much slower. The added advantage in the case of BHC is that it is decidedly cheaper than DDT. Even two per cent BHC has been found to be effective but it may not be available in the market.

The dust is best applied at flowering time when the pest is most active. About 20 lb. of the dust are ordinarily required for an acre and under ordinary circumstances, one judicious application at the proper time is enough. Exceptionally severe attacks, however, may require a second treatment.

The approximate cost of treatment comes to about Rupees five per acre whereas the value of the produce saved may range from Rs. 25 to 75.



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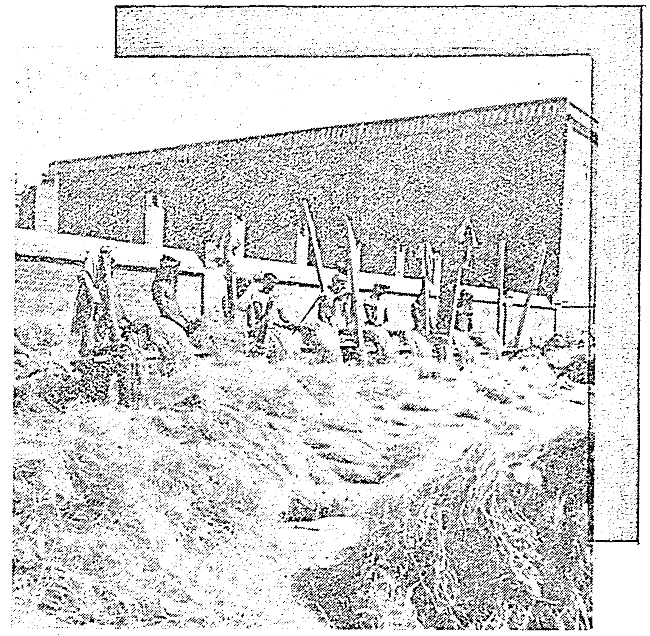
SANNHEMP NOW GOES BY AGMARK



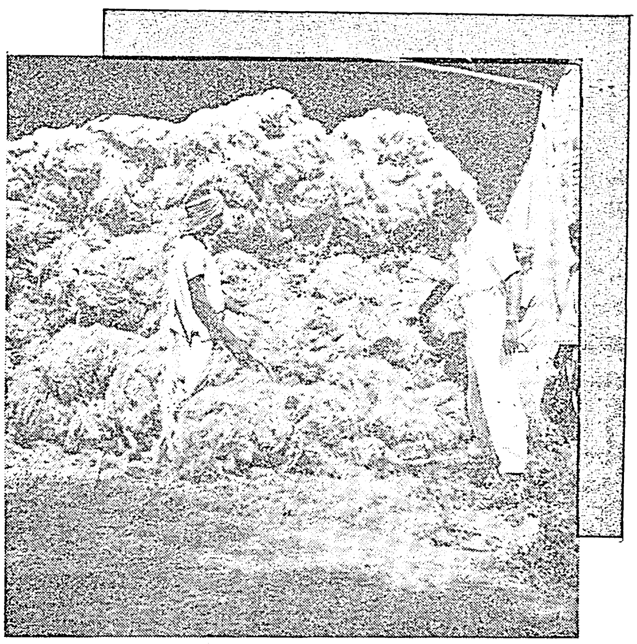
Dressing and grading of green sannhemp at an authorised packer's premises

With profit both to the buyer and seller

by
PARTAP SINGH

QUALITY control of sannhemp exported from India through the Agmark Sannhemp Grading Scheme has brought in changes in certain aspects of marketing with benefit both to the seller and the buyer. The Scheme became operative on the 1st September, 1948.

Prior to the inauguration of the Scheme, foreign buyers used to receive consignments having admixtures of lower grades even up to an extent of 10 per cent, and used to be offered prices on the basis of the lower grade. Complaints used to be common that the different grades shipped abroad invariably contained varying proportions of lower grades, the idea obviously being to palm off some proportions of lower grades at prices realised for higher ones. At such a time, however, the Indian sannhemp actually used to get under-valued. With the elimination of such admixtures and reduction of refraction content to appropriate limits after the Scheme became operative, the buyers began getting correct grades and paying better prices.



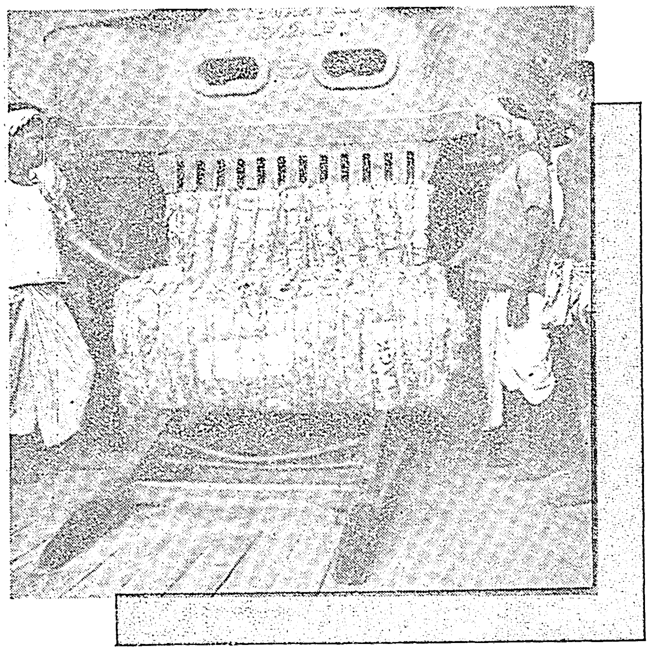
An inspecting officer testing the quality of graded sannhemp prior to its baling

GAIN IN PRICES

As a result, there has been an all-round increase in the prices of Indian sannhemp, although the prices for other fibres like true hemp, *sisal* hemp, jute, etc., registered appreciable reductions. It is believed that the rise in the prices of sannhemp has been principally due to an improvement in the standards of packing and their maintenance at appropriate levels as laid down by the Scheme. The gain in prices has been more than commensurating with the degree of improvement brought about in the standards of packing.

BETTER QUALITY

Not only better prices have been realised, but claims on quality have also been almost eliminated. Before the Scheme was enforced, buyers abroad used to realise substantial sums as claims on quality from shippers in India. In 1947-48, for example, one shipper alone had to pay as much as Rs. 21,500 on 1,554 bales and the arbitration awards ranged from 72 to 135 shillings per ton. As against this, of the two lakh bales exported during the two and a half years immediately after the revised scheme came into force, only 275 bales came for arbitration and the awards ranged from 22 to 70 shillings per ton. Claims since then appear to be almost negligible.



The fully pressed bale of sannhemp bearing the Agmark label going out of the hydraulic press, and another being roped

SAVING IN MARKETING COSTS

Apart from this benefit, the Scheme has brought in an economic saving in marketing costs on the Agmarked *pucca* bales because of the removal of excessive refraction. Formerly, all this excessive refraction used to be packed and shipped with the sannhemp, which meant unnecessary additional expenditure on grading, baling, labour charges and railway and shipping freights. It is now estimated that a sizable saving has been effected on these items of costs because of the removal of excessive refraction.

Prior to the Scheme coming into force, local buyers used to take deliveries of *pucca* bales after examining a bale or two from each lot to satisfy themselves about the correctness of the grade. Whenever it suited the buyers, they used to manage to postpone taking deliveries for a number of days on that excuse. This naturally kept the sellers' money locked up for varying periods. Again, the buyers used to pay only 95 per cent of the value at the time of taking delivery of the bales and the balance was paid provided no claim on quality was received from the buyers. This again meant the locking up of a part of the sellers' capital for a considerable period.

Checking-up the grade of an Agmark bale

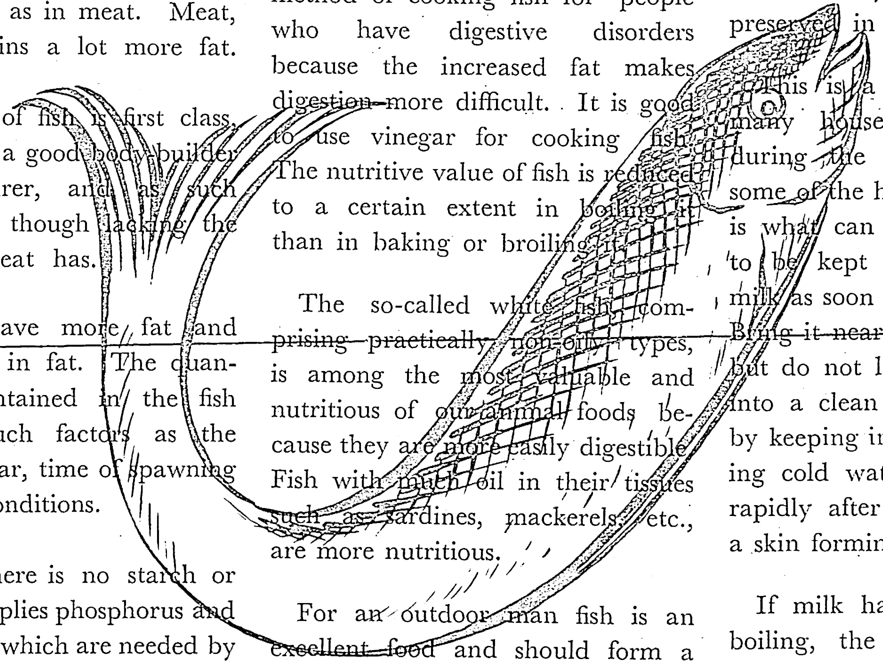
Now, because of the confidence in Agmark labels this disadvantage has been removed. The buyers now cannot postpone taking deliveries on the ground of examining the quality and they are also required to make full payment for their purchases.

CONFIDENCE RESTORED

Local buyers and shippers have also found the Agmark Scheme very helpful. They can now depend upon the quality of bales purchased from any packer. Formerly, bales bearing trade marks of a small number of shippers were acceptable to foreign buyers. Now, on account of the support lent by the Agmark labels, the bales bearing any trade mark have become acceptable. This has enabled not only new parties to enter into the trade but also some of the old ones which had gone out of it to re-enter the export business. With their coming in, the resources of the sannhemp export trade have been strengthened a good deal and the export section of the sannhemp trade has been placed in a better position to negotiate with the buyers abroad and to explore new markets for the produce.

IF YOU HAVE FISH

If you have fish, you sure have a good deal



If you have fish, you have a more complete meal. For, the fish has such good dietetic value that it is a very efficient protective food and unlike milk, meat and eggs, quite a cheap one too.

The amount of protein, which is a body-building substance, in fish is the same as in meat. Meat, however, contains a lot more fat.

The protein of fish is first class, in other words, a good body-builder and tissue-repairer, and as such is a good food though lacking the flavour that meat has.

Some fish have more fat and others are low in fat. The quantity of fat contained in the fish depends on such factors as the season of the year, time of spawning and feeding conditions.

In the fish, there is no starch or sugar, but it supplies phosphorus and calcium both of which are needed by your body. Small fishes, especially with edible bones such as the sardines, contain more of this. The sea fish contain small traces of iodine. Fish contains very little iron.

The Bengal fresh water fish is a rich source of calcium, phosphorus and iron. Fatty fish have the valuable vitamins A and D. Every one knows the utility of the liver oils of some of the fish.

COOKING FISH

In cooking fish a very slight loss of protein occurs. If fish are fried, all the nutritive value is conserved. Frying, however, is not a good method of cooking fish for people who have digestive disorders because the increased fat makes digestion more difficult. It is good to use vinegar for cooking fish. The nutritive value of fish is reduced to a certain extent in boiling it than in baking or broiling it.

The so-called white fish comprising practically non-oily types, is among the most valuable and nutritious of our animal foods because they are more easily digestible. Fish with much oil in their tissues such as sardines, mackerels, etc., are more nutritious.

For an outdoor man fish is an excellent food and should form a regular item in his diet. Dried, smoked, salted and pickled fish are not as good as fresh fish from the point of view of digestion.

There is plenty of waste matter in fish in the form of bones, skin, etc. Whenever possible, the skin should be eaten as it contains the flavoury matter. Fish, compared to meat lacks flavour and hence requires to be cooked and served attractively. A well-cooked fish dish is a good sauce for a meal.

A QUESTION

Here is a question from a house-wife:

How do you think can milk be preserved in the hot weather?

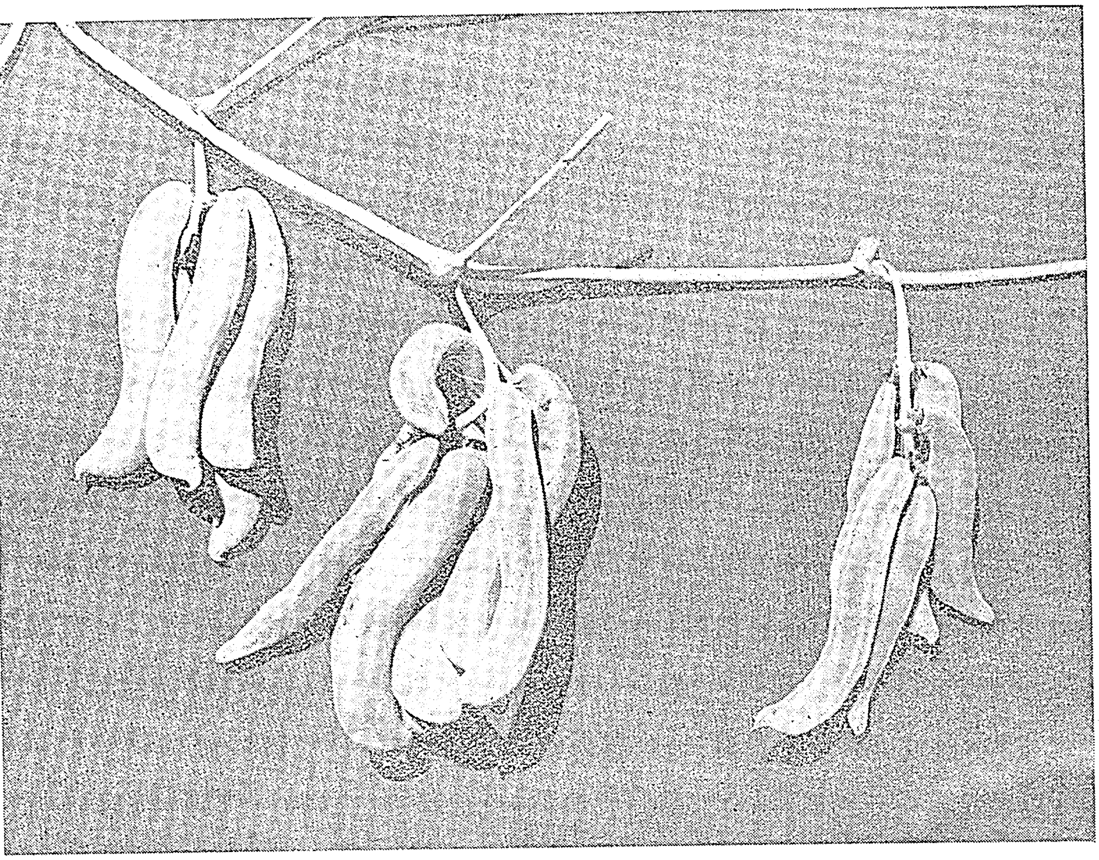
This is a question that worries many house-wives who have to, during the hot weather, preserve some of the household foods. Here is what can be done. If milk is to be kept overnight, scald the milk as soon as it is brought home. Bring it nearly to the boiling point, but do not let it boil. Then pour into a clean jug and cool rapidly by keeping in a large bowl containing cold water. Cooling the milk rapidly after boiling helps prevent a skin forming on top.

If milk has to be kept without boiling, the milk jug should be kept in a bowl of cold water. Then a clean piece of cloth should be soaked in clean water and after wringing it out, completely cover the jug with it, making sure that all the ends are in the water in the bowl. Keep the bowl in a cool and airy place. The water evaporating from the cloth keeps a cool temperature round the milk jug.

MU

new

by
P. M. DABADGHAO
AND
R. T. GANDHI



Fleshy and velvety pods of mucuna clusters

DURING 1952-53, the season being very unfavourable for crop growth owing to the abrupt end of the monsoon in August, green fodder supply to dairy cattle became inadequate on the Farm. The situation was further aggravated by the failure of irrigation supply practically throughout September.

At this time, the dark green cover of mucuna or velvet beans in the field attracted the attention of every one on the Farm. Mucuna, evidently, was indifferent to the vagaries of the monsoon. It was utilised for feeding the dairy cows during the last week of November.

Even at this late stage, the crop yielded 180 maunds of green fodder per acre with only one irrigation. The fodder was relished by cattle when fed alone as well as a mixture with semi-dry *jowar* fodder in equal quantities. A bullock fed at 40 lb. of green mucuna fodder continuously for ten days during this period consumed every bit of it and interestingly enough, showed an increase of ten pounds in body weight.

Mucuna or velvet beans, botanically known as *Mucuna cochinchinensis A. Cheval* and *Mucuna deeringiana (Bort) Holland*, from Australia prominently attracted our attention during our search for new and better legume plants for trial as fodder crops under irrigated conditions.

The velvet beans are an annual *kharif* legume with a very vigorous growth. The vines grow 10 to 15 feet long and the field is densely covered in about 60 to 70 days after sowing in July. The general growth characters of both *M. Cochinchinensis A. Cheval* and *M. deeringiana (Bort) Holland* are more or less similar and they continue to remain green till the end of November. The only distinctive character is the size and colour of seed which is bigger and whitish in the former and smaller and blackish in the latter. The large and fleshy pods having a velvety touch are borne in clusters in both these species.

The profitable utilisation of mucuna in the cropping season was further confirmed by the results obtained during the season 1953-54. We then started studying the various avenues of its exploitation. In an attempt to improve upon the cropping system in the fodder supply scheme evolved earlier, mucuna was sown along with maize on a quarter-acre plot, side by side with the maize-cowpea mixture. The maize-mucuna

UCUNA, the
y green fodder

The wonder legume that laughs away droughty conditions

mixture yielded 380 maunds of green fodder per acre compared to the out-turn of 280 maunds per acre from the old maize-cowpea mixture. In the favourable season of 1953-54, mucuna alone yielded 200 maunds of green fodder per acre without any extra irrigation.

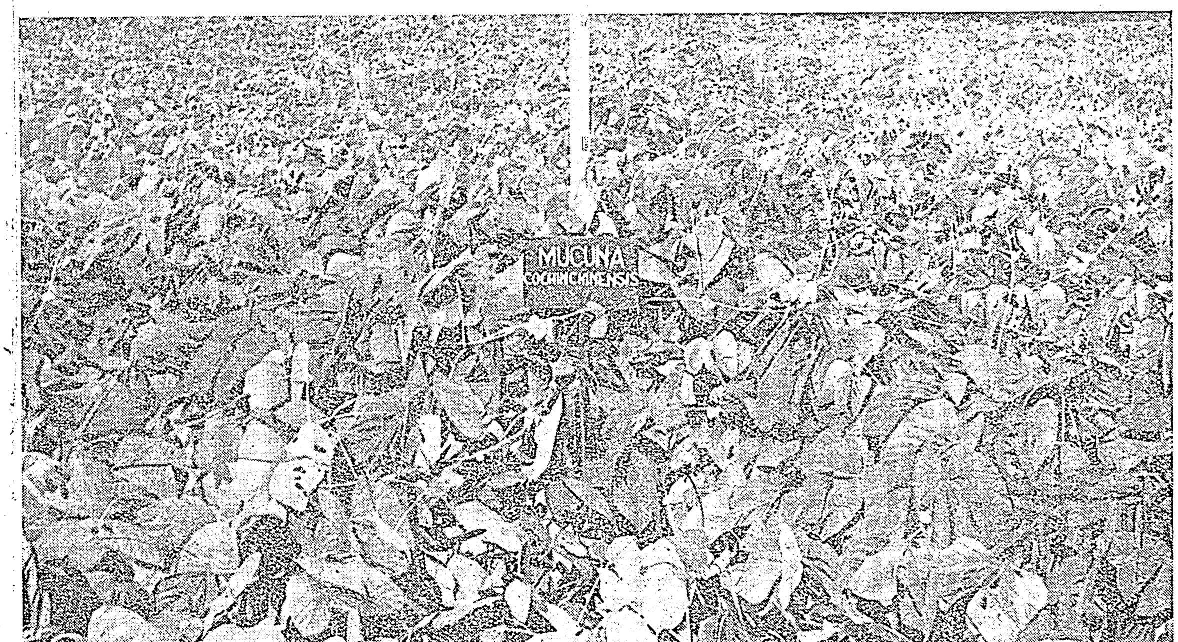
The next trial we attempted was to grow a mixture of maize and mucuna in successive monthly sowings from April-July. This mixture yielded more, to the extent of 45 to 50 per cent on an average, over the yield of comparable stands of maize-cowpea mixture. The mixture was not only superior in the total yield, but also showed better combining ability of mucuna with maize. Unlike cowpea, which hardly kept pace with the growing maize plants, thereby covering the maize stalks only partially, mucuna was observed to grow quickly, uniformly covering the maize shoot all along its entire height.

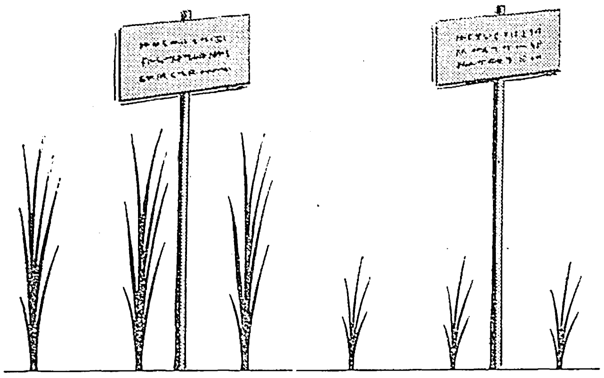
The chemical analysis of this interesting legume showed 20 per cent protein, 2.31 per cent calcium and 0.84 per cent phosphoric acid, when cut at the flowering stage in October. Even during the mature stage at the end of November, the protein content remained at 13.9 per cent.

Mucuna can be cultivated for fodder like cowpea. The seed, however, is drilled in lines two to three feet apart, using a seed-rate of 80 to 100 lb. per acre. One interculture in the initial stage of growth and manuring with two to two and a half maunds of superphosphate benefit the crop. Like other leguminous fodder crops, inoculation of soil with bacterial culture is necessary. On the same field the crop is always better from the second year onwards.

In view of the quick and luxuriant growth, high yielding capacity, excellent combining ability with maize for fodder, a high nutritive value, palatability, and above all, its quality to remain green during the month of November, mucuna is worthy of growing alone or as mixture with maize or *jowar* for green fodder.

A densely covered inviting stand of mucuna at the Indian Agricultural Research Institute, New Delhi





DRIVING A POINT

Teach yourself the easy ways of teaching villagers to do things

THE village worker on many occasions is called upon to teach villagers how to do new kinds of work. He may first have to do the job himself in front of the villagers to convince them of the utility of the method. Such a demonstration is called a method demonstration.

A method demonstration may be simple such as planting seeds in lines, treating seed for smut or using a mechanical sprayer; it may be more complicated such as making soap, drying fruits and vegetables or building a sanitary latrine.

METHOD DEMONSTRATION

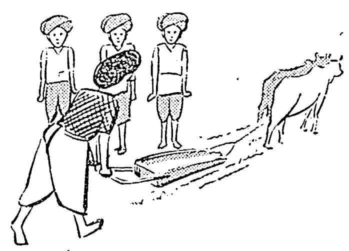
So that a demonstration may be successful the village worker must know every step in the job perfectly. It would need a good deal of planning and careful practice to make a proper impression on his audience.

A properly timed demonstration will have greater effect on the villagers. For example, do not show villagers how to spray for insects *after* the insects have done their damage. There may also be jobs on which villagers themselves want to see a demonstration. The village worker should rise to the occasion whenever villagers express such a desire.

Having prepared yourself to give a demonstration, the help of the village people should be sought to secure the proper place for holding the demonstration. Care should be taken to decide on the best time, advertise the event properly and have enough space for all those who want to see. All the necessary equipment required for the demonstration should be procured well ahead of time.

The presentation will be interesting if you have chosen a subject in which people have shown interest. It is necessary that you should act naturally, be dressed for the particular job you are doing, so that you won't appear awkward to the villagers, and stand erect, looking at your audience when talking. The talk should be clear and easily audible. If you are able to show that you are enjoying doing the job you will appear more friendly, and hence be effective.

First of all, tell the villagers the what, why and how of the job. Then let willing villagers do



the job as long as time and interest allow, correct mistakes politely, encouraging questions and answering them thoroughly. In case you do not know the answer to a question, make it a point later to get the answer for those who are interested.

After a demonstration the village worker should make it easy for villagers to adopt the new practice. He should also help them get necessary equipment and materials. He should be available for any additional information needed by the villager. If possible, written instructions or a leaflet explaining

HOME THROUGH DEMONSTRATION

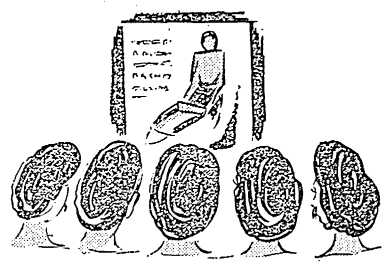
the process should be left with those villagers he hopes will adopt the new practice.

RESULT DEMONSTRATION

The measure of a successful demonstration is the number of people who adopt a new method. The method of showing people the value of an improved practice is called a result demonstration. This is done by comparing the improved and the unimproved practices so that villagers may see and judge for themselves, and may be used to teach the villagers the value of an improved variety of seed, anti-malarial measures, an improved plough, use of fertilizer, improved cultural practices, etc.

The practice demonstrated must be good and based on a real need of the villagers. This can be ensured by consulting an expert about the utility of the practice in the village, discussing it with the villagers, carefully assessing if villagers already know its value, and finding out if they are interested in the new practice.

After having decided to demonstrate the new practice a villager who has the confidence and respect of his neighbour and who is interested in improving his methods



should be selected to carry out the demonstration.

In the beginning, a demonstrator should be asked to demonstrate only one practice at a time. The village worker should visit his demonstrators to plan the demonstration by selecting plots which would be easily seen by the villagers, measuring off equal areas of land side by side, one showing the wrong way the other showing the right way.

Thereafter, all necessary material and equipment should be got ready and the village people had present when the demonstration begins. Proper records should be kept from the beginning.

In order to complete the job, make a calender of all work that must be done and visit the demonstration often to see that plans are being carried out properly. Give publicity to the demonstrator if the demonstration is succeeding. The village demonstrator should be allowed to do the talking. A summary of the records should be prepared and the results given publicity to get other farmers to demonstrate during the next season.

—From the forthcoming publication "Extension Guide for the Village Worker"

Planning for Proper Land Use in Damodar Valley

A scientific study of land has to be made before it can be put to the use to which it is best suited. Here is an outline of what is being done to put land to proper use in the Damodar Valley area

by

S. P. TEOTIA

LAND classification surveys as the first step towards planning soil and water conservation measures are being carried out in the Damodar Valley. Such surveys will provide basic data for grouping together of soils suitable for a given type of vegetation depending on the capacity or potentiality of the land to produce.

The whole of the upper Damodar catchment area, comprising 4.4 million acres, has been divided into a number of convenient units for the purpose of these surveys. Ultimately, the whole of the upper Damodar catchment will be surveyed. For the present, reconnaissance surveys have been carried out to locate problem areas where restoration work is urgently needed.

Land classification surveys are the basis for proper land use adjustment. They are an attempt in a systematic way to assign each area the use to which it is best suited physically, economically and socially. Land capability classification, however, does not necessarily reflect the present state of the land on which application of suitable methods of soil and water conservation such as provision of irrigation facilities for the paddy fields, afforestation of waste and unproductive lands, contour ditching and graded channel terraces for the uplands, reclamation of waste lands for upland cultivation and pasture and gully control or reclamation may have to be adopted to make it productive.

Soil conservation surveys include three types of surveys, viz., soil survey for mapping the various soil types, land utilization survey and erosion survey. Air photographs on six inches to a mile scale are being used as base maps for indicating soil types, present land use and erosion conditions.

SOIL SURVEY

Soil profiles of the size 4 ft. × 4 ft. are dug up to the depth of decomposed parent rock, and the position of each profile site is fixed on the air photograph. Some of the major and minor soil characteristics and associated land features noted along the traverse are soil depth, soil texture, soil structure, soil reaction, organic matter, drainage, permeability, type of parent material, slope and special features like clay pan or hard pan, calcium concretions, stoniness, etc.

The profile site is selected in the central position of an apparently uniform area. A full description of the soil profile at each examination site, along with a note on environment (relief drainage, physiography and vegetation), is recorded in the profile note book. Each horizon of the profile is examined as regards colour, structure, reaction, etc. Soil samples from the various horizons of a type profile are taken for analysis in the laboratory.

Soil boundaries may be indicated by a change in colour, topography, texture of surface soil and sometimes by vigour or species of vegetation. Soil boundaries are usually diffused or gradual rather than sudden or sharply defined. The soil boundaries are deduced by interpolation from evidence of soil profiles. Soil types are mapped from a study of soil profiles. A model profile with allowable range in the profiles is established for each soil type.

LAND UTILIZATION SURVEY

The purpose of land utilization survey is to map the present use of land such as crop land, pasture, forest, scrub land, orchard, water bodies (ponds, tanks, etc.) waste and unproductive lands, settlement (including roads, parks, buildings, etc.) and mining and also to distinguish and map the different types of land. This provides basic data to enable preparation of a land utilization plan to avoid further misuse of land.

Each of the major categories is further subdivided and mapped. For example, crop land is classified into upland and low land (paddy). These are shown by suitable symbols and colour combinations on the maps. For classification of land based on quality, four types are distinguished and mapped on the basis of inherent soil characteristics like depth, permeability, drainage, stoniness and associated factors like availability of water. These are good land, medium land, marginal land and poor land.

EROSION SURVEY

The objectives of erosion mapping are two-fold: "(a) To give a quantitative estimate of the changes that have occurred and (b) to give an indication of the past and possible future damage. Also it shows what is left in the way of productive soil."

Processes of denudation, transportation and deposition take place on an accelerated scale in every catchment unit under cultivation. The erosion map should form a base for any planning. Since in Damodar Valley the topography is very undulating and rolling, an undisturbed area is not available, except within a reserved forest, the selection of a 'reference profile' for each soil type is essential for mapping the degree of erosion. A normal profile is not possible since a virgin piece of land under permanent vegetation not subjected to erosion is not available.

A reference profile for each soil type is selected after due consideration of the area occupied by that soil type, as comparisons are to be made on comparable slopes. The standards of solum thickness or different slope classes within the permissible range of a soil type are slightly different. The erosion is estimated by weighing other soil profiles of the same soil type in the area with the reference profile of this soil type.

Soil erosion types are influenced by physiographic features and land utilization practices. Special erosional features are found associated with each physiogrphic unit. The different land forms, i.e., the plateau, escarpement, valley and rugged hilly regions will have different types of erosion. Areas where people are engaged in mining and industry and have neglected cropping get eroded more badly as compared to the areas where people are engaged in farming or areas under reserved forests.

In the case of gullies, in addition to frequency, the depth and width of gullies are also mapped. Mapping the depth and width of gullies helps in determining what control measures for conservation of gullies are to be adopted.

Depending on frequency, depth and width, some of the gullies can be reclaimed into paddy fields, some have to be afforested and then there are others that are non-reclaimable and have to be tackled as gully area. Conversion of such gully areas into conservation ponds or putting up gully plugs, check dams and spillways, etc., will all be governed by the depth and width of the gullies.

For the existing conditions in the Valley, the lands have been classified into the following four land use classes according to their capabilities by taking into consideration erosion, present land use and other relevant data on socio-economic factors:

Class I—Very good land, level or nearly level with little erosion. Easily and safely cultivable by ordinary good farming methods like fertilization and rotation of crops.

Class II—Good land, normally upland with slopes 0 to 3 per cent. Moderate sheet erosion but safely cultivable by adopting soil conservation practices like contouring, strip cropping, protective cover and water management by graded channel terraces.

Class III—A few low to medium gullies or slopes exceeding three per cent. Soil heavy and deep, slopes moderately or severely eroded. Readily reclaimable by mechanical or other means and bench-terraced paddy fields.

Class IV—Lands not suitable for cultivation, but suitable for pasture or forest with contour ditching, diversion dykes or terraces.

Research Note

COLD STORAGE OF GUAVAS

by

K. Kripal Singh and P. B. Mathur

EXPERIMENTS recently carried out at the Central Food Technological Research Institute, Mysore, have shown that the optimum conditions for cold storage of guavas are a room temperature of 47 to 50° F and a relative humidity of 85 to 90 per cent. The storage life was found to be four weeks and post-storage life (at 76 to 87° F Mysore room temperature) three days.

Guavas of the *safeda* variety were procured from the Government Fruit Research Station, Hessarghatta, Mysore State, for this experiment. Mature fruits showing a slight change in colour from green to yellow in two sizes, viz., a large size with a mean weight of 168·9 gm. and a small size with a mean weight of 92·9 gm., were selected. The greatest retention of ascorbic acid was observed at 47 to 50° F in both the sizes. Loss in weight was found to be lower in large fruits than in the smaller ones.

With regard to chemical changes in guavas during storage, there was an increase in the percentage of total soluble solids, a decrease in total acidity and ascorbic acid content at all the temperature ranges investigated.

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NEW BOOKS RECEIVED

Report of the Minimum Wages Committee (Agriculture), Government of Madhya Bharat. Copies available from the Commissioner of Labour, Baxibagh, Indore, Madhya Bharat.

"*Bhagirath*", a Monthly devoted to irrigation and power. Editor K. S. Rangappa. Annual subscription Rs. 3, single copy Annas 4. Copies available from the Director, Publications Division, Old Secretariat, Delhi.

Fifty Years of Co-operation, Golden Jubilee Souvenir, 1904-54. Published by the Bombay Provincial Co-operative Institute, 9, Bakehouse Lane, Fort, Bombay. Pages viii+300, price Rs. 10.

A survey of co-operative development and a study in co-operative problems in India.

The Feeding of Farm Animals in India by P.E. Lander. Issued by the Indian Council of Agricultural Research; available from M/S. Macmillan & Co., 294, Bow Bazar Street, Calcutta 12. Pages xii+492+LII (appendixes), price Rs. 14.

A manual on animal husbandry containing fundamental principles and practical aspects of animal nutrition with special reference to Indian conditions.

WHAT'S NEW IN FARMING

GREEN MANURE ON THE SPOT

GLYRICIDIA MACULATA is becoming more and more popular with rice-growing farmers in Madras State as a leguminous plant that provides green manure more or less permanently and on the spot. It is generally grown on the bunds of paddy fields.

A week before Glyricidia seedlings are transplanted, pits, a span or more in diameter, are dug six feet apart and filled in with well-decomposed farmyard manure or compost. The pits are next well-watered, and two to three weeks old seedlings are planted one in each pit and watered. Care is taken to see that seedlings of only two to three weeks are planted. In lifting the seedlings, special care is taken to see that the roots are not damaged. By the time paddy is harvested, the seedlings would have grown beyond the reach of goats and stray cattle.

Branches of Glyricidia are lopped off for the first time a year after the plants are established, and thereafter as and when required.

A pound of Glyricidia contains about 6,000 seeds. The plant is most suitable for growing on the paddy field bunds where two paddy crops are raised in a year.

At the Aduthurai Research Station in Madras State, a single Glyricidia plant gave as much as 300 lb. of green leaves from the third year onwards.

If plants from one pound of seed are raised and properly tended, they will yield, according to specialists, enough green matter for manuring 300 acres from the third year onwards.

DRY SEED-BED FOR PADDY

Investigations carried out at the Central Rice Research Institute and elsewhere have shown that wherever the sowing of seeds in lines in seed-beds is practised in some of the rice-growing tracts in the country, a new method can be tried with success.

According to the new method, seed at the rate of three to four pounds per cent of nursery is sown in plough furrows. As the plough furrow is formed with a country plough, a man follows it sowing the seed. Roughly, about nine ounces of seed are required to sow 100 running feet of the furrow, if the seed-rate is three pounds per cent of bed. As the plough makes the next furrow at a distance of about ten inches, the seed sown in the previous furrow usually gets covered. The sowing can be done in straight lines by a skilled ploughman, which will facilitate weeding later.

It was found that seedlings by this method grew robustly and the uprooting was also as easy as in the Japanese method.

The method is now strongly being recommended for soil conditions as in Cuttack, where the land is well-ploughed after paddy harvest, and the soil is of the nature of a sandy loam. The method does not involve as much labour as in raising seedlings by the Japanese system.

WASHING SHEEP

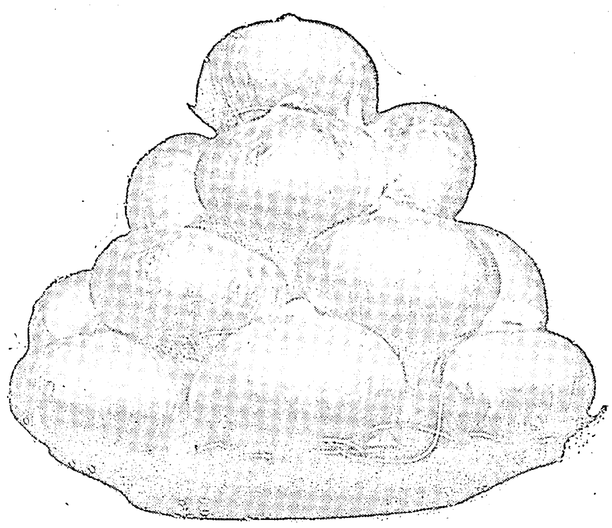
The washing of sheep before shearing has been advocated as a means of improving the make up of the wool clip for the market. Some sheep breeders have taken up the washing of sheep before shearing, but they do not know much about the interval desired between the two operations. Neither a short nor a long interval is desired. It has been found in the Punjab that an interval of seven to nine days under normal weather conditions between washing and shearing gives the best results.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

GROWING ONIONS

Who does not know the way of cultivating onions? But here is how you do it better



The Large Red Flat variety of onions

by

S.S. PUREWAL

AN ONION is a ripened bulb of a biennial plant botanically known as *Allium cepa*. The flesh of the bulb comprises the swollen bases of the green foliage leaves and fleshy scales. In the early stages of growth when days are short, the foliage leaves develop, whereas with the approach of long day conditions, the leaf bases begin to swell to form a bulb and no further foliage leaves are formed and swelling of the basal fleshy scales progresses till maturity.

The onion was cultivated before the era of recorded history, and used as a food by natives in many Middle Asiatic countries, believed to be the primary centre of origin of the bulb onion. The Near East Asiatic and the Mediterranian regions are believed to be the secondary centres of origin. Onion has a Sanskrit name and is grown in India since remote times.

Onion is an important vegetable crop, extensively grown all over India both as a field and garden crop. The crop is raised mainly for home consumption, but the production of mature onions in the States of Bombay and Madras is more than the local requirements, and most of the exports are made from these States. Nearly a million maunds of onions are annually exported from India to Japan, Malaya States, Burma, Ceylon, Hong Kong, Portuguese East Africa and Persia.

Onion is popularly used both in the raw and mature bulb stages as vegetable, in salads, pickles, sauces, extracts like onion powder and onion salt and for flavouring culinary preparations. Onion is considered of little practical importance from the point of view of healthful food, and it is said that the purchaser of onion pays mainly for its smell. In protective foods it contains a little of vitamins C and B, also traces of iron and calcium.

These facts, however, do not minimise the popularity of onion. Practically all types of people like it and appreciate it in spite of its pungency and strong odour that lingers for a considerable time after it has been consumed or handled. The chewing of a few seeds of caraway or a small cardamom will immediately suppress this odour.

The particular substance to which onion owes its pungency is a volatile oil known as allylpropyl-disulphide. The pungency of the onion varies with the variety, stage of maturity, the type of soil and soil moisture, growing temperature and the length of storage period. There is a steady increase in the volatile substance till the maximum is reached just before the tops begin to fall over. Then it gradually decreases. Varieties with more moisture-content are less pungent than those with comparatively less moisture-content.

Onions grown on sandy soil are less pungent than those grown on other types of soil, but the pungency increases with the increase in average growing temperature. The onion odour acts as a repellent to insects. It is said that during the Great Plague of London the only places immune to plague were the onion and garlic shops. It is a common belief that the snake does not enter the premises where white onions are kept.

Freshly expressed onion juice is used against

flatulence, dysentery and cholera. The ripe bulbs are a useful feed for cattle and poultry.

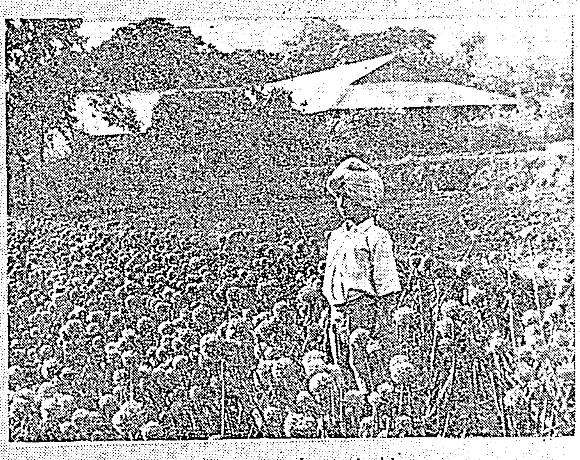
CLIMATIC REQUIREMENTS

The onion can be grown under a wide range of climatic conditions, but it succeeds best in a mild season without great extremes of heat, cold and excessive rainfall. The plant is quite hardy and in the young stage can withstand freezing temperature. A comparatively cool temperature and an ample supply of moisture are necessary for the plant in the early stages of growth, but during ripening, warm and dry conditions are necessary for proper maturation, harvesting and curing of the bulbs.

A longer daylight of 12 to 16 hours and a high temperature of above 80° F have a positive influence on bulb-formation and maturity, and consequently on the yield of onion bulbs. But the initial growth of the roots and tops of the onion plant is more vigorous at comparatively low temperature of 68°F and short day-length of 9 to 12 hours. If these conditions continue during the bulbing stage, the onion plants go to seed readily, whereas even with the long days if temperature is low, maturation does not take place. It is, therefore, essential that the sowing time should be so adjusted that the plants make enough vegetative growth before the approach of the bulbing stage.

SEED AND SOWING TIME

The bulk of the main ripe onion bulb crop is grown in the country from true seed, the seedlings of which are first grown in the nursery bed for transplanting out in the field later. In northern India, the seed is sown in the nursery bed from August till the end of November, but the best time for sowing the seed is from the 15th of October to the 5th of November.



An onion seed crop in bloom

Seedlings raised from the seed sown earlier than the 15th of October are usually transplanted for the production of green bunching onions locally known as *ghandel* or *laira*. Desirable types of bulbs cannot be obtained from this crop, as most of the plants will produce seed stocks resulting in small-sized hollow bulbs. The transplanting of seedlings into the field is done when they are six to eight weeks old during the month of December-January.

About six to eight pounds of seed sown in the nursery bed will produce enough seedlings for an acre, but when the crop is sown directly in the field, the seed-rate should be doubled to ensure good stand. Although onions withstand crowding, provided other conditions for growth are favourable, the seed-rate should be so adjusted as to avoid the laborious and costly job of thinning.

In most parts of Bombay, the best sowing time in the nursery bed is the middle of October and eight to ten pounds of seed is used to raise enough seedlings for an acre. In some other parts of the State like Dharwar and Hansur taluk of Mysore, the crop is raised during the summer months by sowing the seed direct in the field in April-May. The sets produced are pulled out in the beginning of August and replanted in the beginning of September to raise the main crop in December. The seed is sown during the months of October and November in the State of Hyderabad, middle of December in Madhya Pradesh and Berar and from September to November in West Bengal.

On the hills, the crop is raised during the summer months and the seed is sown from the end of February to the end of May, but in places where snow-fall is not heavy, the winter crop of October to June, is also raised. The germinating power of the seed does not last long, and the viability is lost in one to two years. Good seed is triangular and black or dark brown in colour. The loss of germinating capacity can be made out when the seed looks paler, especially along the marginal edges. Such seed is light in weight. An ounce of normal seed has about 7,000 seeds.

PREPARATION OF SOIL

Although onions can be grown successfully on a great variety of soils, easily worked, deeply cultivated loams are most suitable for the crop. In fact, all friable soils such as alluvial soils and sandy loams are quite suitable, because of the delicate nature of the young seedlings and the great amount of hand labour required in onion culture.

Growing on light sandy soils results in earlier maturity than on heavier soils, and when properly enriched with organic matter and fertilizers, solid heavy bulbs of a superior keeping quality are produced, while very acid and very alkaline soils cause slow growth and late maturity of crop. However, the commercial production of onions is not difficult and soils of various textures are either suitable or can be made suitable by cultivation and manuring.

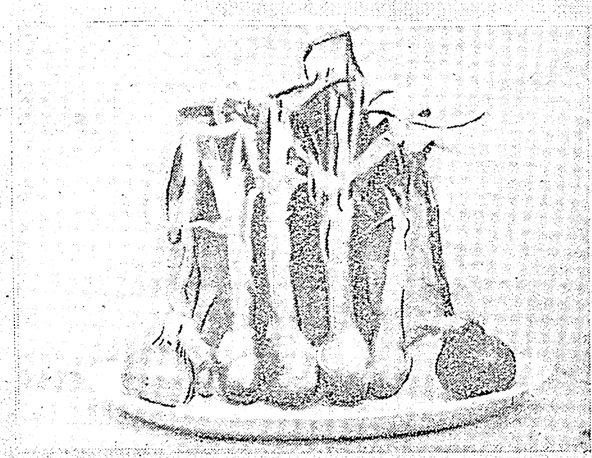
Normally, badly drained soils are not satisfactory. Clay soils should also be avoided as they become too hard and compact for obtaining the best results. A level land is preferred, because seeds, sets or young shallow-rooted plants are easily washed out on sloping areas. This aspect is also important in the production of a good crop. The field should be open, away from shading trees and taller crops that prevent free circulation of air and exposure to the sun rays. Clear land, free from weed seeds should be chosen, preferably land that has been well-manured and cultivated or cleaned from a previous crop.

Rotation is very important, and onions usually follow a heavily-manured crop like potatoes which requires a thorough cultivation and leaves the land comparatively free of weeds. Onions following clovers and cereals thrive well.

The method of preparation of land will depend mainly upon the character of the soil and the crop previously grown. Onion grown from seed requires a finer degree of tilth than most vegetables. The soil preparation must be thorough to prepare a fine, firm and smooth seed-bed. The last operation before sowing seed or transplanting should be a good rolling to consolidate the soil. Deep ploughing is not to be done, except for breaking the stubble.

In places where onions are to follow rice, the excessive water should be drained off by making trenches 20 ft. to 30 ft. apart immediately after harvesting the rice crop. Land should be ploughed with a furrow-turning plough and left for drying. Three to four shallow ploughings may be given subsequently, clods broken and pulverised by using a roller. Onion being a shallow feeder, most of the roots penetrate to a depth of not more than two to three inches and the crop thrives well on a hard bottom. Deep ploughing, therefore, is unnecessary for onion.

Onions: well-matured and scallions



MANURING

The soil for onions should be rich in available plant food, especially humus, as such a soil is retentive of moisture and its surface can be worked to a fine tilth. It has been found impossible to obtain high yields without an adequate supply of organic manure applied to the soil well in advance of the planting or sowing time. Farmyard manure or green manures must be used freely to maintain a favourable physical condition of the soil.

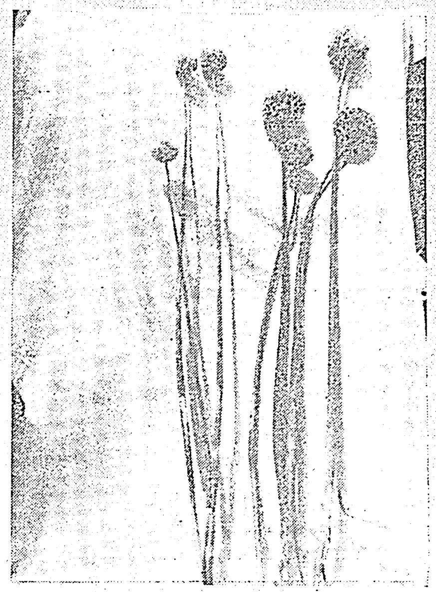
Well-rotted farmyard manure should be applied at the rate of 10 to 20 tons per acre after the first ploughing, so that it may become well-mixed during subsequent ploughings in the preparation of the seed-bed, or it may preferably be applied to the preceding crop.

Application of commercial fertilizers, particularly the nitrogenous ones, especially when farmyard manure is used in smaller quantities, prove beneficial, but overdoses are detrimental to the keeping quality of the bulbs and cause the appearance of 'bull necks' in a higher percentage of the crop. Nitrogen-starved plants are yellowish green and thick-necked. An application of six maunds of ammonium sulphate —half at the time of transplanting and the remaining half one month after, gives best results. Soot and ash are popularly used with advantage as a dressing after the crop has been transplanted.

VARIETIES

Onion being an old and established vegetable, there are a large number of varieties in cultivation throughout the country, differing in colour, shape, size, pungency, keeping quality and time of maturity. No systematic classification of these varieties has been attempted in this country as varieties are passed and listed by seedsmen under various local names, such as Red Globe, White Globe, Yellow Globe, White Patna, Large Red, Patna Red, Poona Red, Nasik Red, Yedu Giri or Bellary Red and Dhulia, mostly named after the colour of the skin or outer scales, which may be red, white or yellow.

A number of imported types like White Portugal, Silver Skin, Australian Brown, Red Italian and Sweet Spanish are also offered by seed merchants. The white-skinned varieties are mild and of good flavour as compared to the red varieties that are comparatively



Healthy and blight-affected (left) non-seed stalks

more pungent, but keep better owing to the presence of catechol and protocatechic acid in the skin.

SOWING METHOD

Ripe onions are generally produced from transplants, which in turn are produced by sowing the seed in the nursery bed, six to eight weeks prior to transplanting. Dry onions are also produced by planting seed directly in the open field where the crop is to mature, as well as by planting medium-sized mature onion sets.

FROM TRANSPLANTS

The chief advantages from this method are the use of a lesser seed-rate, earlier maturity, the formation of large and more uniform bulbs, a better stand, higher yields and better control of weeds. However, the main disadvantage is the laborious and costly method of transplanting by hand.

For production of the seedlings, seed should be sown broadcast or in drills made four to six inches apart in a thoroughly prepared bed, the soil of which has been enriched with the addition of a half ton of well-rotted farmyard manure and two pounds of ammonium sulphate per *marla* (272 sq. ft.) space. About two pounds of seed is sown per *marla*.

The seed should be covered about half inch deep with fine soil. Water should be applied with a sprinkling can immediately after sowing, soaking the soil well, or a light irrigation given. Irrigation should be repeated every third or fourth day, till the plants are well-established. The seedlings will come up in about a week's time, and will be ready for transplanting in six to eight weeks.

The field where seedlings are to be transplanted should be divided into small plots of a convenient size for irrigation and marked in rows 9 to 12 inches apart, and seedlings set out three to four inches apart in the rows. Although closer plantings than these give higher out-turn, the size of the bulbs will remain small and will not be suitable for marketing. Seedlings should be set not deeper than one to one and a half inches. An irrigation may be given immediately after transplanting.

FROM TRUE SEED

Onion may be propagated by sowing the seed directly in the field in rows 12 inches apart. The seed is dibbled about half inch deep in heavy soil, three-fourth of an inch in most soils and one inch in sandy soils. For sowing directly, the seed-bed should be prepared as thoroughly as possible, pulverizing the soil completely and levelling the surface even and smooth. Then the field should be laid out in plots to facilitate irrigation. The rows may be marked by stretching a long rope and walking over it, and on these marks furrows may be opened with the sharpened end of a stick or some sort of marker, opening three or four furrows at a time. The seed may then be dropped by hand so that the seeds are spaced about one to two inches apart in the furrows.

Coarse sand may be mixed with seed to facilitate even distribution. In case the sand has been mixed with seed, it should be lightly covered in the furrows. A very light irrigation should be given immediately after sowing followed by another after four to five days. The seedlings will push through the surface in about a week's time. When the plants are six to eight weeks old, they may be thinned to the proper distance in the row and the thinnings transplanted in some other plot or sold off. This method of growing onion is not practised in this country to any great extent, but it is worthy of adoption.

GROWING FROM DRY SETS

The third method of producing onion is by planting dry onion sets from the previous year's crop. The crop grown from the sets yields higher and matures earlier when the market prices are high. The sets are planted in rows 12 inches apart and spaced four inches in the rows. The medium-sized sets of half to three-fourth of an inch diameter are the most desirable for planting, as the larger sets send up seed stalks before the bulbs reach a marketable size while small sets give weak plants. About 15 to 20 maunds (1,230 to 1,640 lb.) of sets will be required to plant an acre.

The dry onion sets are small bulbs produced by growing the plants under crowded conditions in the field. Seed is sown thickly in rows, nine to twelve inches apart. About one to one and a half maunds (80 to 120 lb.) of seed is required to plant an acre (75 to 100 seeds per foot of drill in the same manner as described above).

For the production of sets, globe-shaped early varieties should be used, as the sets from these keep better in storage. The sets should be harvested as soon as the crop is ripe and before real hot weather sets in. They are pulled out by the handful, the tops twisted off and the bulbs dropped in a basket and removed from the field. The sets should be removed to shade for curing as they are harvested. If they are left in the hot sun their keeping quality is impaired. After curing the sets, the largest bulbs should be screened out and used for pickling or kept for the production of early green onion. The rest of the sets should then be removed to storage where they should be sorted out occasionally and the rotting ones removed.

The green onions or *ghandel* as they are called in the North, because they start to send up seed stalks and become tough unless pulled out promptly and sold in the market, are grown for sale when in the green stage. The simplest way to produce green onions is to plant the smallest bulbs from the previous crop in September to October in rows nine to twelve inches apart and the bulbs spaced four inches in the rows. If large bulbs are used, they may be cut into three to four pieces each, taking care that each piece has a portion of "stem plate" (root zone) with it. The large dry onion sets may also be used to advantage for the production of green onions. These are usually ready to be pulled out four to five weeks after planting.

IRRIGATION

Onion requires a steady moisture supply for continuous growth. Irrigation should be given once every two weeks during the cool growing period, and more frequently when the hot weather sets in. In all, eight to nine irrigations are sufficient to mature the crop. When the crop is nearing maturity, it may be watered sparingly and when the tops start falling over, irrigation should be stopped altogether.

WEED CONTROL

In order to produce a good crop of onions, it is

necessary that weeds should be kept under control, especially in the early stages of growth when the plant grows slowly and is readily injured by weeds. Frequent weedings should be done so that the weeds do not become large enough to rob the onions of moisture, nutrients and light. Moreover, if the weeds are allowed to overgrow, in removing them the root system of the onion plant may be disturbed, causing an abnormal development of the bulbs. The onion is a shallow-rooted plant and deep tillage is likely to injure the roots and thus decrease the yield.

HARVESTING

The green bunching onions, *ghandel* or *laira*, are harvested as soon as they attain an edible size. Several pullings, usually by hand, are obtained, and each time only the largest plants are removed, leaving the others to develop further. The roots are washed and the outer skin is peeled off leaving the stem clean and white. The onions are then tied in bunches, the number in each bunch depending upon the size of the onion bulbs and local custom.

Onions for the market should be harvested when they are fully mature. Maturity is indicated by the tops falling over while the leaves are still green. The onions should be pulled out when the tops have fallen over and the leaves have turned yellow. This insures getting the onions harvested while they are in good condition. If rains start while the ripe onions are still in the field, they start into a second growth, ruining their keeping quality. However, in case of the scallions, i.e., plants whose necks remain rigid and the tops do not fall over, ripening is abnormal and indicates a poor keeping quality.

The bulbs are pulled out with the aid of a sharp-edged hand tool (*khurpa*) and soon removed to shade for curing, in order to avoid sun-scalding in an excessively hot weather. The tops should be cut off one to one half inch from the bulb as soon as possible after the bulbs are removed from the field. The onions should be spread over the floor of the room in a layer not over three to four inches deep and should be cured for a week or ten days, till the necks have altogether dried. A well-cured onion is firm and the top of the bulb is not readily dented with the thumb.

STORAGE

At the time of harvest, the market price for onions is usually very low, and as such it is customary to store onions for a pretty long time either for home consumption or for sale when market prices are higher. In the countryside, onions are usually stored by spreading them on the floor or on racks or keeping them in baskets in well-ventilated thatched sheds or rooms.

Frequent inspection and removal of rotting bulbs and loose skins and turning over of the stored product should be done. Occasionally, they are stored in small thatched pyramids of wheat straw, sorghum straw or *sarkanda*, constructed in the open on roofs or under shade to allow the circulation of a maximum amount of air around the bulbs and to provide protection from rains or moisture. This method is probably the cheapest and quite efficient. Onions are most profitably stored in cold storage at 32 to 36° F and low humidity (60 to 70 per cent).

Onions for storage should be thoroughly matured, cured and dried before being stored. Onions of good keeping quality are solid to the touch and have tough clinging skins. Soft and immature specimens and those with thick necks, bruised or injured do not keep well and should be eliminated.

YIELD

The average yield of ripe onions varies greatly with the type of soil, irrigations given and the amount of manures and fertilizers applied. The average yield of a transplanted crop varies from 100 to 300 maunds (8,200 to 24,600 lb). per acre. When the crop is raised by growing the seed directly in the field, yields are low, but when it is raised from sets, the yields are usually usually high.

MARKETING

Ripe onions are either marketed soon after harvest-

ing or kept in storage for a considerable time for disposal at a later date. When the produce is to be disposed of at harvest, it should be taken to the market immediately as the bulbs lose weight greatly after harvesting. The cured onions are usually taken to the market in ordinary gunny bags, but it is advisable to use open mesh sacks with a coarse mesh through which the bulbs can be readily seen. These are attractive and give ventilation and facilitate inspection by the prospective buyer. Grading is not ordinarily done in this country, but to secure good prices, it is highly desirable that proper grading is done before marketing the produce.

SEED PRODUCTION

Selected bulbs of a large size from the previous year's crop are planted in the field in rows two feet apart and bulbs spaced one foot as under during the month of September-October. A furrow three to four inches deep is opened and the bulbs are set in and covered by hand. Prior to sowing, one half to one third of the top portion of the bulb should be cut off to facilitate the emergence and straight growing of shoots. Moreover, the cutting of the bulbs is associated with earlier sprouting, better stand, more seed stalks and larger yield from both the plant and seed stalks. The upper cut portion may be used for edible purposes. Onion is a cross-pollinated plant, and as such when the production of seed of more than one variety is desired they should be spaced at least a furlong apart. The seed should be harvested when the capsules ripen and the black seeds are seen. The umbels or seed-heads should be cut from the stalk and collected in a cloth, supported round the waist of the picker. When thoroughly dried, the seed should be threshed and winnowed clean and thoroughly dried before storing.

PESTS AND DISEASES

Onion, though comparatively free from diseases and pests, is severely attacked by the most injurious insects called onion thrips (*Thrips tabaci*). Thrips are very minute, slender-bodied, whitish, sucking insects, which attack the leaves of the onion plants, giving them a blanched or blighted appearance. The insects feed under the sheath of leaves, in-between the young leaves at the centre of the plants and even inside the broken and split leaves. The leaves become curled and deformed and the outer leaves turn brown at the tips. The insects are most injurious during dry weather. As soon as the insects are noticed attacking the crop, it should be dusted with five per cent B.H.C or sprayed with D.D.T. 550 powder—two ounces in 33 seers (66 lb.) of water. The dusting and spraying should be repeated at weekly intervals till the pest is under control.

Alternaria palundii is a fungal disease attacking the foliage and seed stalks of the onion plant. Localised brown spots appear that gradually spread and coalesce, forming into dead lesions. The leaves and seed stalks consequently die and fall over, resulting in a tremendous decrease in yield. As a prophylactic measure, the crop should be sprayed with 3 : 3 : 50 : Bordeaux mixture. The burning of dead tops, a proper rotation and dusting with flowers of sulphur are recommended for the control of the disease.

Neck rot caused by *Botrytis allii* attacks mature onion bulbs in storage. The infection usually takes place at curing time, through the exposed moist tissue. The white varieties, scallions and injured bulbs are more susceptible than normal ones. The lesions on the bulbs appear as sunken dried areas about the neck but may involve the whole bulb that ultimately rots, giving a stinking smell. The fungus can tide over the winter. The disease can be controlled by proper rotation or sanitation, elimination of late application of fertilizers to avoid scallions, clean tillage, rapid curing, close topping, careful handling and thorough ventilation throughout the storage period. The rotten bulbs should be occasionally sorted out.

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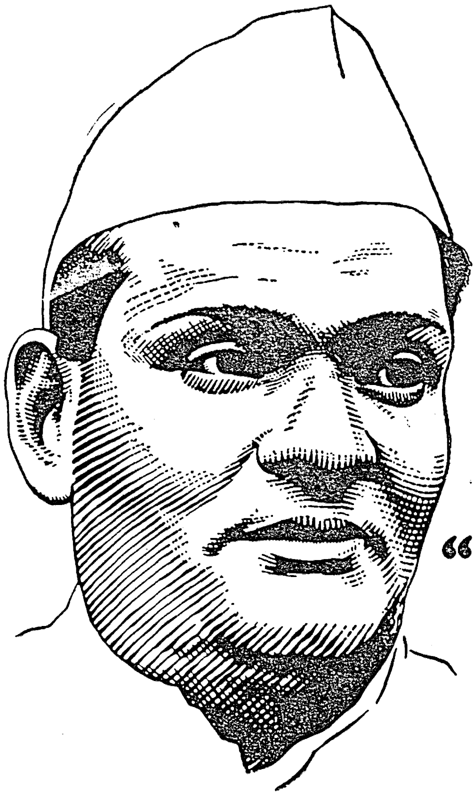

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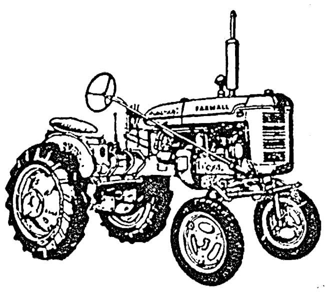

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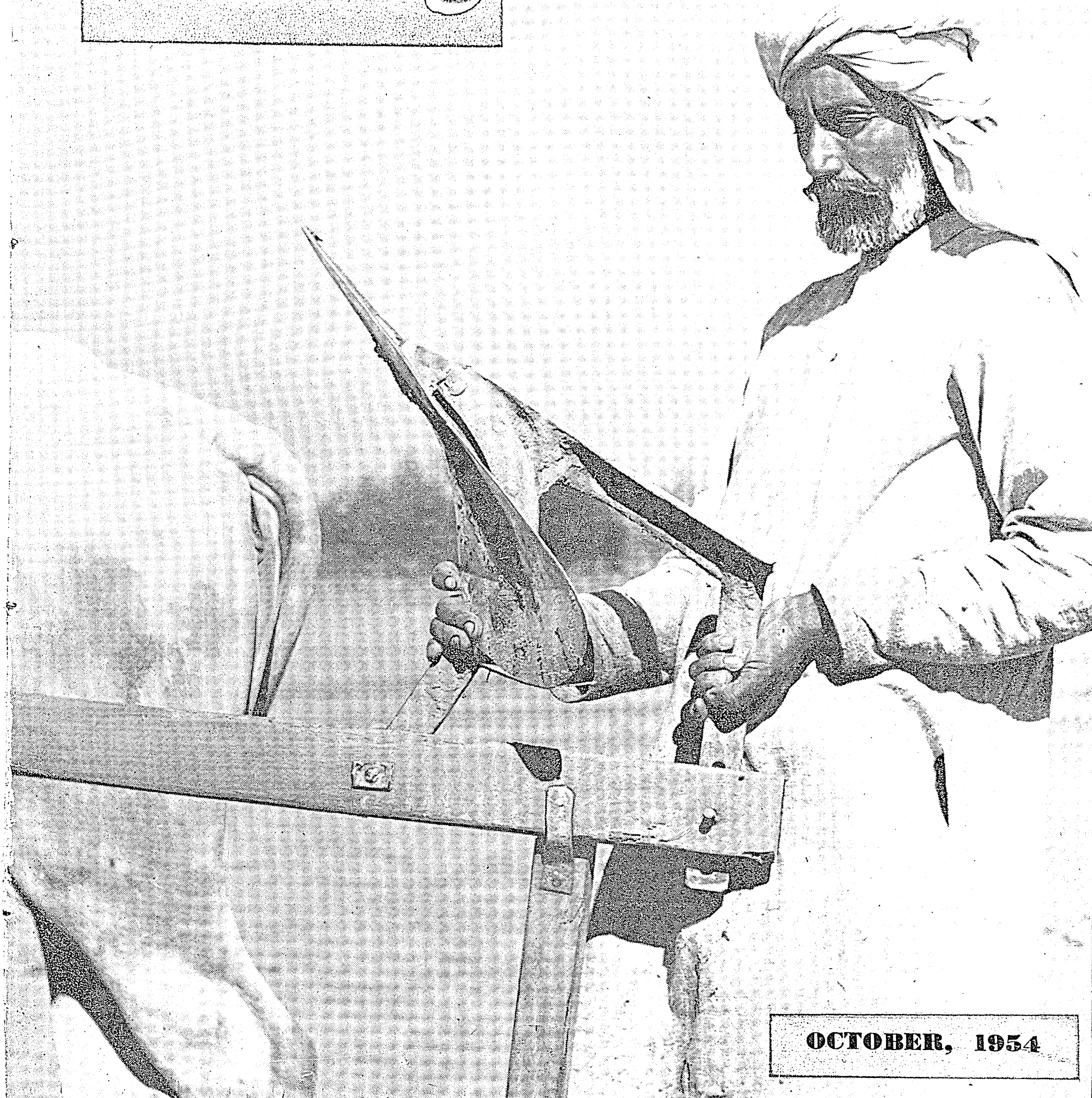

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THE PROBLEM OF NUTRITION

SOUTH-EAST ASIA is a land mass which has gained notoriety for being one of the densely peopled parts of the world. India belongs to this region and the pressure of population on land in this country has been widely acknowledged.

Apart from the question of human beings, India has another formidable problem to contend with. This relates to cattle. India has almost two-thirds of the world's bovine population.

Thus the problem facing agricultural planning in India is to provide adequate nutrition both for men and cattle. In fact, this competition between cattle and human population for food is one of the many characteristics of Indian agriculture. Because human population is growing at an accelerated pace, more and more land is being brought under cultivation, so that the land left for the production of cattle feed is getting increasingly diminished. It is, therefore, apparent that if agriculture is to progress in India on reasonable lines, a balance should be struck between the nutritional needs of the human population and those of cattle.

Because of the ban imposed on the slaughter of cattle in many parts of the country, it is reasonable to assume that the number of cattle will increase to a great extent in future. So, as years pass by, a large number of cattle has to be cared for than previously. Also at the present rate of increase of human population, provision has to be made for feeding a larger number of men, women and children on an increasingly diminishing land allotment per capita.

It appears that the only way of solving this problem is to hit upon certain food crops which can be utilised in part for feeding human population and in part for cattle. At present, fodder has to be specially grown for cattle and food for human beings. Apparently this may not be possible to any considerable extent in future. It may, therefore, be necessary to breed varieties of crops which can remain in a succulent stage even at the time of grain production. This might be helpful to a solution of the problem as the grains may be utilised as food for human beings and the straw as fodder. This may appear fantastic at present, but human history is replete with stories of impracticable ideas being given concrete shapes by mere stress of times.

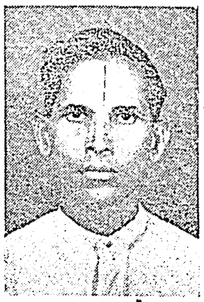
Of course from time to time suggestions have been made for maintaining cattle on processed refuse or rejected parts of human food materials. Thus, for example, it has been reported that mango seed kernel, *jaman* seed, etc., after appropriate treatment, could be utilised as cattle feed. Certain treatments given to straw, especially of paddy, have been reported to make it palatable as fodder.

Although the question is yet to be tackled, much less solved, what has been said above indicates that there is a growing awareness of the existence of human *vis a vis* cattle nutrition problems. It may be possible that follow-up research will indicate a probable direction which if rationally pursued will yield an acceptable solution.

OUR COVER

A farmer of PEPSU proudly holds up the soil inversion plough that he uses on his farm. This double-purpose action plough cuts the earth, turns the disturbed soil to one side, covering the row cut on the previous furrow. A plough like this is invaluable for turning in and covering green manures.

Farmers I Have Met



GREEN MANURING SHOWED HIM THE WAY

"FOR the first time, my paddy yields have doubled this year because of my application of a sufficient quantity of green manure for the crop," was what Shri M.B. Bakthavatsalu Reddy, a farmer of Chingelpet district in Madras State, whom I met recently, told me. His maximum yield till last year was 15 bags (about 2,400 lb.) per acre, whereas his current year's yield amounted to 31 bags (about 5,000 lb.) per acre.

Narrating the various methods he had been trying to improve yields during the last few years, Mr. Reddy said that green manure succeeded as nothing else did, and he got this phenomenal increase this year. He cited examples and said that application of green manure in abundance at the proper time would increase the yield not only of paddy but other crops as well. " This, however, does not mean that I have lost faith in the efficacy of fertilizers ", he hastened to add.

Sesbania, according to Mr. Reddy, has proved to be the most effective green manure. Apart from growing this plant on the farm bunds, he has specially set apart a portion of his 20-acre plot to grow green manure. This, he said, was to ensure a continuous and plentiful supply. Moreover, compared to fertilizers, green manure is cheap.

Mr. Reddy firmly believes in adopting improved agricultural methods and follows the suggestions offered by the Agricultural Department in all his farming operations. This, he assured me, has always been to his advantage.

Apart from paddy cultivation, Mr. Reddy also grows commercial crops like vegetables, bananas, etc.

He maintains a team of eight permanent workers and looks after their welfare. When the farming season starts, casual labour will be recruited to supplement the permanent labour employed by him.

Mr. Reddy, who is 45, is a matriculate and his sole occupation is agriculture. He has entered the crop competition to be held next year and hopes to get a prize.

As he gets sufficient water to irrigate his farm from the farm-wells, failure of monsoon will not upset his farming operations. " But rainfall at the appropriate time is like application of an extra dose of fertilizers ", thinks Mr. Reddy.

—K.E.S.

Man of the Month

Shri Balasubramania Iyer

DURING the days of food shortage in India, Prime Minister Nehru used to define a patriot as 'one who made two blades grow where one grew before'. Judged by this definition, Mr. Balasubramania Iyer, Headmaster, Sir P.S. Sivaswami Iyer High School, Tirukattupalli (Madras State), is more than a patriot, for he makes many blades grow where none ever grew before.

Tirukattupalli is a small village in Tanjore district which is called the 'granary of South India'. The village is reached by bus from Budalur, a station on the Southern Railway, and five miles from it.

While making his usual stroll on the Tirukattupalli-Budalur road one evening, Mr. Balasubramania Iyer's eyes fell on a piece of undulating land, nearly 30 acres in extent, lying fallow and surrounded by green paddy fields. On a closer examination of the land, he found that only a few *babul* and palmyra trees grew on it and that all other forms of vegetation were absent. He made enquiries regarding the ownership of the land and learnt that it belonged to the Madras Government. On his return, he felt that the land instead of lying fallow should give place to something that would make it a proud possession for its owner.

HEADMASTER turns farmer and conquers alkali too

by

K. VEDANTAM

Schoolboys planting paddy on the School farm, with the Headmaster (right) giving them the right directions

With this in view, he addressed the Government of Madras for alienation of the land to the School. In his application, he stated, among other things, that he required the land

(1) to impart agricultural education to boys studying in his High School,

(2) to grow enough paddy to meet the requirements of 120 boarders in the hostel attached to the High School,

(3) to start a model farm for the benefit of neighbouring farmers,

(4) to run a seed farm to multiply improved paddy strains for supply to Government and local farmers, and

(5) to conduct experiments and research.

THE FARM TAKES SHAPE

In April 1947, the land was assigned in favour of the School. The condition of the land, however, was such that reclamation by human labour would have involved much waste of time and money. So Mr. Iyer obtained the services of a bull-dozer from the Agricultural Department and set about reclaiming the land. It was first levelled and then divided into bunded fields. Areas were allocated to grow wet, dry and garden crops.

A fish-pond was constructed to develop pisciculture. Roads were laid to facilitate easy traffic within the Farm and coconut and Glyricidia seedlings planted on either side of the roads. For purposes of summer cultivation, four wells were dug. Sanction of the Engineering Department was secured to use the Cauvery river water for irrigating the fields. All these took nearly six months to complete and cost over ten thousand rupees. Neighbouring farmers who watched the operations smiled at the efforts of the Headmaster and often wondered whether he was not a 'lunatic' in thus wasting money (bequeathed to the School by a great man) to improve land that could never be improved.

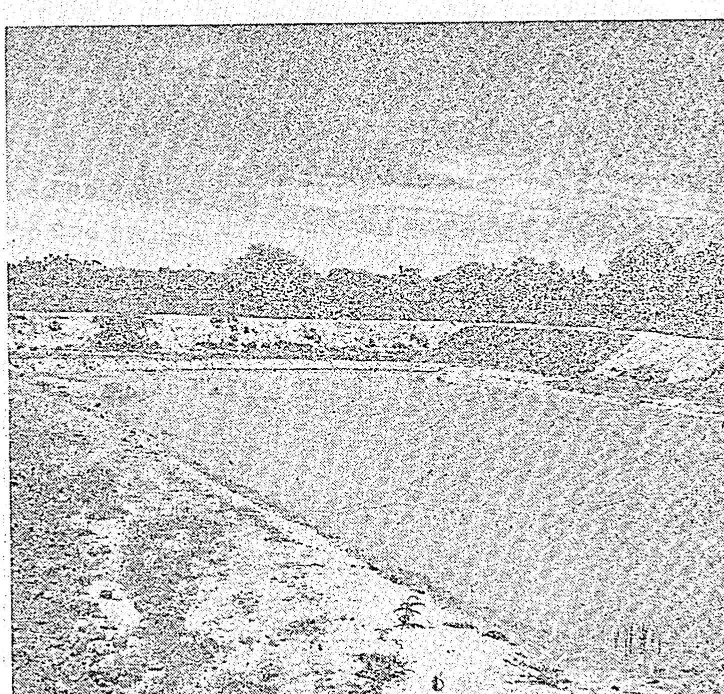
A land that was never cultivated was for the first time brought under paddy in 1948. The Farm was christened Sivaswamipuram Farm, in memory of the founder of the School.

To fertilize the fields, compost from the local Panchayat Board was purchased. This was supplemented by a few cartloads of green leaf manure. The maiden attempt resulted in a grand return of ten bags of paddy from 30 acres! In other words, the yield per acre was 40 pounds. Neighbours smiled to see their prophecy come true.

Mr. Iyer, however, did not lose heart. He consulted agricultural officers to find out the reasons for the poor yield in his farm and was told that the soil was very alkaline. He took samples of the soil and sent them to the Government Agricultural Chemist, Coimbatore, for analysis. The Chemist's report stated that the soil had a high concentration of salts and suggested remedies to overcome the defect. These, in essence, were:

Puddling the rice fields—this nice looking field was once a waste land

The fish pond attached to the School shows people how ponds can be put to a good use



(1) provision oi drainage facilities which the fields lacked for the removal of salts in solution,

(2) periodical removal of salt encrustations appearing on the surface of the soil when soil moisture got evaporated,

(3) addition of gypsum at the rate of half a ton per acre to neutralize the action of certain injurious salts,

(4) addition of large quantities of tank and river-silt,

(5) growing of saline-resistant paddy varieties, and

(6) addition of plenty of organic matter in the form of cattle manure, compost, cakes and green manure.

The dairy which he started in the hostel to meet the milk-needs of the boarders provided about 300 cartloads of cattle manure. Farm refuse, school and hostel sweepings, etc., went into the compost pits and yielded about 300 cartloads of compost manure. The Glyricidia trees grown along the roads in the Farm yielded a good amount of organic matter. Sesbania seedlings planted alongside the bunds of paddy fields simultaneously with the transplanting of paddy seedlings, furnished enough green manure for the succeeding paddy crop. Crops like indigo, sannhemp and *dhaincha* grown in the Farm during the off season also provided much of the green manure requirements of the Farm.

INCREASE IN YIELD

The cumulative effect of the adoption of these measures resulted in an increased yield of 160 bags of paddy in 1949, the second year of trial. The land got improved a great deal. Two years of practical experience, frequent contacts with agricultural officers, visits to neighbouring Agricultural Research stations, voracious reading of books on agricultural and allied subjects—all these had their effect on the Headmaster, now an amateur agriculturist.

Mr. Iyer now turned his attention to the use of chemical fertilizers for his crop in conjunction with organic manures. He found that a dose of 100 pounds of superphosphate applied at the time of transplanting followed by 50 pounds of ammonium sulphate after the first weeding and 50 pounds a fortnight before flowering, resulted in higher yield. During 1950-51, the Farm-yield rose to about 400 bags. The very ryots who scorned his attempts to reclaim alkaline land in 1948 were first to congratulate him on the success achieved.

In the succeeding years, Mr. Iyer renewed his efforts to further increase the yield. For this, he used some of the best paddy strains evolved by the Agricultural Department. Co. 25, a strain resistant to blast disease and a high yielder, became his favourite strain. The yield was gradually pushed up to about 600 bags at which figure it now stands. Mr. Iyer has fixed his target at 1,000 bags.

In two successive seasons, Mr. Iyer tried the Japanese method of rice cultivation. There was a small increase in the yield but the phenomenal increase associated with the Japanese system was not in evidence probably because alkaline soils do not tolerate heavy applications of chemical manures.

The Madras Government appreciated his efforts and offered him a number of prizes for outstanding contribution to better farming. They registered the Farm as a model one. They regularly purchased his paddy and green manure seeds.

To make the Farm up-to-date in every sense, electrical connection was secured to work the pumps in the Farm. These bale out water during summer when crops like *cholam* (*jowar*), maize and *ragi*, which tolerate alkalinity to a certain extent, are cultivated.

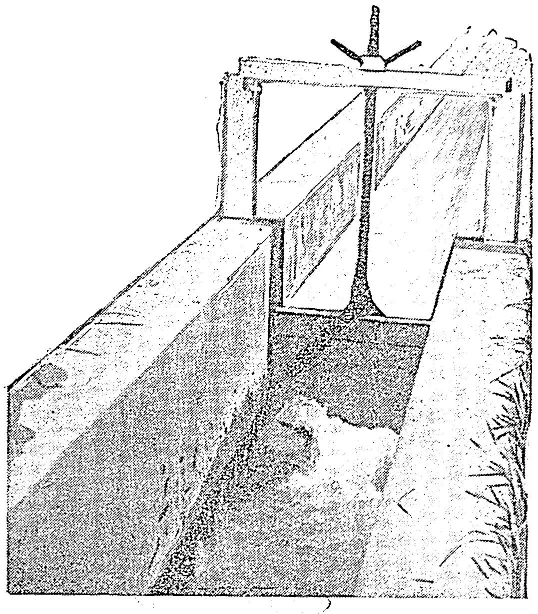
NEW VENTURES

The need to attain self-sufficiency in the matter of food (apart from paddy and milk which were already being produced in sufficient quantities) inspired him to enter on new ventures.

About nine acres of Government land lying on the banks of the Cauvery river were taken on long lease and reclaimed with the aid of a tractor by Mr. Iyer. The vegetable needs of the hostel are met from the supply of this farm. All varieties of vegetables are grown there. To meet fuel needs a small *casuarina* garden has also been planted. In the campus of the School nearly nine acres in extent are grown with coconut and citrus trees. To the School is attached a small apiary to teach bee-keeping to boys. To meet the needs of the Dairy and to improve the quality of milch animals of the locality, a Sindhi breeding bull and a Murrah buffalo stud are also maintained in the school campus.

Mr. Iyer, 61, is very tall—about six feet. He is sixty-one but does not look it. He believes more in doing than in talking and hence talks little. He is happy in the company of the young for whom he lives and works. He is very strict in his dealings but that does not prevent him from being liberal when necessary. He is a very hard taskmaster but that does not prevent him from appreciating good work done by his assistants in the School and in the Farm. His two sons want him to retire from active life and enjoy a well-earned rest. But to them the man says, "No". He wants to serve national interests as long as he can. His devoted wife assists him and shares the pleasures and pains of a Headmaster turned farmer.

Today the Sivaswamipuram Farm is a place of pilgrimage to officers of the agricultural, veterinary, revenue and engineering departments, to farmers of the neighbourhood, to students of agriculture and to many others who like to see good things done in a better way.



WASTE WATER

NOW HELPS RAISE MULTIPLE CROPS

by
T. C. Roy

HOW proper planning and development of existing material resources can, with the co-operation of all concerned, be harnessed for collective welfare is being demonstrated in the fields at Chandrahati, a place about two miles from Tribeni in Hooghly district, West Bengal, which stands on the confluence of the Saraswati, the Jamuna and the Ganges.

The fields, which were entirely at the mercy of the rains, are now yielding two or three crops a year, and crop failure, which was not uncommon in the locality, has become a thing of the past.

The scheme is to make full use of the effluent water of the factory of Messrs. Tribeni Tissues Ltd., hitherto running waste to the Ganges, for irrigating the agricultural lands of the neighbouring seven *mouzas* of Raghunathpur, Benipur, Madhusudanpur, Tribeni Baikunthapur, Demra, Raghabpur and Gopalpur, covering an area of about 800 acres.

A triple alliance of cultivators, the Mill authorities and Agricultural Officers of the State Government has made the utilisation of effluent water for irrigation a reality.

The idea was first mooted out in 1951, during a period of acute drought. The question was taken up with the Mill authorities, who agreed to divert a small portion of the effluent to the fields of neighbouring farmers. Encouraged with the results achieved during the year, cultivators of the area formed a strong committee, including the Mill Manager and the Subdivisional Agricultural Officer, Hooghly, to devise ways and means for efficient utilisation of this effluent water.

A complete contour survey of the area was undertaken in the following year, and small irrigation-cum-drainage projects drawn up on the basis of this survey. The speed of effluent was such as to scour away a considerable area. It was, therefore, necessary to construct *pucca* channels to minimise the speed of the running water before actually releasing it to the fields, and as such an irrigation scheme was also drawn up. Work on the Scheme started early in 1953 and was completed by the spring of the year.

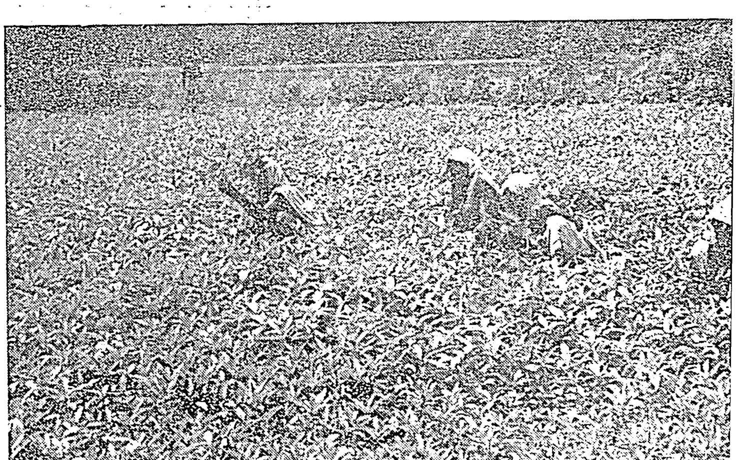
Thus the Madhusudanpur Drainage Scheme, popularly known as the 'Trifasali Khal', diverted 15 to 20 lakh gallons of water per day otherwise running waste to the Ganges to the fields.

Out of the total cost of Rs. 4,821 a third was borne by the beneficiaries and the remaining two-third by the Government.

The water not only ensured against crop failures in the area, but has also provided an opportunity for double, and even multiple-cropping. Widespread demonstration was organised for double and multiple cropping, such as the growing of jute and *aus* paddy followed by *aman* onions and *khesari*. Cash crops like sugarcane and potatoes and green manuring crops were also grown. Triple-cropping, as the name of the Khal implies, was the objective. In the first year (1952-53), 21 *bighas* were put under triple-cropping. In 1953-54, the area under triple-cropping increased to 210 *bighas*.

About 600 *bighas* were double-cropped. All the plots in the commanded area, comprising 800 acres, are expected to be double-cropped. From a plot-to-plot survey for assessment of the benefits accrued, it was found that the value of the extra yield obtained was to the tune of Rs. 1,23,090 during the two years under cultivation.

A good crop of jute raised on effluent water and (above) one of the channels built to regulate the speed of water



KEEP THE POTATO MOTH OUT

Research leads to new, surer method of control

by

A. C. Sen

Frequent irrigations help reduce pest attack. Below, a potato field being irrigated

POTATO-GROWERS in Bihar have now some efficient methods to control the potato moth which does a great deal of damage to the crop in the field and the store, as a result of research conducted at Sabour under a scheme financed by the Indian Council of Agricultural Research.

The findings of the research conducted are of great practical utility to the farmers in Bihar. The State has 95,000 acres under the crop each year, which is a quarter of the total potato area in the Union, and produces a fifth of the total potato produced in the country.

Estimates show that from 25 to 70 per cent of the potato is damaged in the store due to the pest. Under field conditions, the pest mines into the leaves and destroys young plants. Though the moth breeds practically throughout the year, it is seen most by the end of February, when almost every plant in the field is found infested. The moth gets ample chances of laying eggs in the tubers before they are dug out and transported to the godown. At least five per cent of the tubers get infected at this stage, and this is how infection is carried to the store.

It is advisable to check this infection right in the field itself. This can be done by resorting to several steps, the first being irrigation. Frequent irrigations check formation of cracks and crevices, and make the soil impenetrable to the pest. Investigations show that eight to ten irrigations produce the desirable results.

Thorough and timely earthings up prevent infestation of tubers by filling up cracks and crevices in the soil, and giving less chances for the pest larvae to bore inside and attack newly-formed tubers. Two to three earthings serve the purpose.

When the crop is about two and a half months old and leaves start drying up, it is the best time for harvest. As the pest population is small at this stage the infestation of harvested tubers is also very small.

Dusting the infested field with two per cent DDT at 30 lb. per acre, or spraying with DDT. 0.125 per cent (water dispersible) at 100 gallons per acre affords considerable immunity from pest-attack, and this insecticidal treatment can be resorted to by all farmers.

Under storage conditions, most of the damage is caused during April to July. In case the tubers are stored under sand, the moth lays eggs on the sand or on the wall or floor of the godown, instead of in the eyes-buds of the tubers. Caterpillars that hatch out find their way through the sand to the tubers. The field is not infected because of infected seed. The moths themselves begin to quit the godown by the end of September and establish themselves in the field on young brinjal, tobacco or tomato plants before migrating to the primary crop.

From the field, though the pest is generally carried to the store through infested tubers at the time of harvest, occasionally the moth also flies from the neighbouring fields to the godown.

Observations show that the activity of the moth is checked in broad daylight as well as in complete darkness, while maximum activity is during the dark out-

doors and in diffused daylight under godown conditions.

The eggs show a very low viability, varying from 30 to 40 per cent when laid on a place like the verandah where there is free movement of air. The highest rate of multiplication was found at a temperature varying from 86° to 100° F.

A godown, measuring 18 ft. × 16 ft. × 18 ft., and receiving daylight from two openings of about one square foot each with cross ventilation arrangement, is sufficient to keep the activity of the moth under check.

As the control of the pest in the store has a direct correlation with its control under field conditions, it is essential to take necessary precautionary measures from the time the potatoes are in the field.

CONTROL IN THE GODOWN

From the experience gained, certain measures will have to be undertaken to control the pest in the godown. Potatoes which are mechanically injured or which have black spots on their eye-buds should be rejected. Sorted out potatoes should be treated with one of the following disinfectants to kill moth eggs laid on the eye-buds of the harvested potatoes: (a) sanitary fluid one per cent, (b) potassium permanganate solution 0.5 per cent, (c) bleaching powder 0.3 per cent, (d) pyridine dust two per cent and (e) pyrethrum emulsion 1.5 per cent.

Godowns for storing potatoes should be straw-thatched, preferably with dry *kacha* (mud-plastered) walls and floors, and provided with arrangement for cross ventilation. The plinth should be at least one foot above the ground. The godown should be such as to remain protected from the direct heat of the sun and the temperature may not exceed 70° F. The inner walls of the godown should be sprayed with 1.5 per cent DDT (water dispersible) at intervals of three months. This has been found to keep down the pest infestation to an appreciable extent.

A raised platform of mud about six inches high should be built in the godown and plastered with a mixture of mud and cow-dung, and left to dry thoroughly; or *machans* may be prepared in the godown in the form of shelves along the wall. Shelves can be made of a simple design by means of bamboo-sticks and palm-leaf mats supported on strong bamboo or other wooden poles. They are to be kept two feet apart from one another.

COVERING MEDIUM

Coarse river-sand, thoroughly dried and cooled, has been found to be the best covering medium for storing potatoes. This should be spread either on the raised platform or on each shelf to form a bed of about one inch in thickness. The topmost shelf should be kept about six feet below the ceiling.

The potatoes can also be intermixed with garlic bits at the rate of four chhataks per maund of potatoes and then covered with the sand so as to make the top layer one inch thick. It has been found that when the thickness of the top layer of the sand is two inches or more, it induces rot. It has also been found expedient to keep crushed garlic bits spread on this top layer of sand.

The potatoes should either be dusted with five per cent BHC or DDT at two ounces per maund and then stored either on the raised platform or on *machan*, exposed or under sand-covering, as described. The insecticide should be mixed with either talc or dry earth and sprinkled evenly on the tubers kept in separate containers.

Many farmers in Patna have been getting excellent results by using very small quantity of the insecticide, say, one pound in 40 maunds potatoes, by thoroughly mixing the insecticide with finely ground red earth and spreading it over the tubers so as to give a good coating.

OPERATION REPEATED

This operation is repeated three times during the storage period. The heap should be examined from time to time and any cocoon or caterpillar of the pest that may be found should be removed along with the affected tubers. During the monsoon period, the stored potatoes should be taken out from beneath the sand and kept in baskets or on *machan*. This practice reduces the percentage of rottage to a great extent.

The potatoes thus treated should be used for seed purposes alone, as the use of chemicals on potatoes meant for consumption is not advisable from the health point of view.

The kerosene oil trap has also proved very effective in destroying adult moths. It consists of an earthen basin of 18 in. diameter containing water with a film of kerosene oil (50:1) on its surface. It should be used during the day as well as night in the potato-stores, but in the field it should be used only during the early evening hours. At the end of every week, the water in the basin should be changed. A large number of adult moths are attracted to the trap and are killed.

A complete cultural and manurial programme for the coconut garden

COCONUTS— more, bigger, better

AT the Central Coconut Research Station, Kasaragod, it was found that intercultivating the coconut garden alone without any manuring increased the yield of nuts by about 170 per cent, while the yield of trees in the uncultivated and unmanured fields declined by seven per cent every year.

This is only an indication of how the cononut palm responds to proper cultural attention paid to it. In fact, with a proper manurial and cultural programme for the existing coconut area in the country, we can easily upgrade production to meet our coconut requirements.

Coconut experts are recommending a schedule which includes manuring, intercultivation, irrigation and control measures for pests and diseases for raising the yields of coconuts.

In a normal coconut palm growing under suitable conditions, there is a continuous process of fruit production, and in the course of a year, there are about ten harvests. The coconut tree, therefore, steadily utilises food material from the soil which results in depletion of plant foods from it. It is estimated that in an acre of coconut garden which yields about 2,000 nuts per year, there is a loss of roughly 18 lb. of nitrogen, 5 lb. of phosphoric acid and 38 lb. of potash. This, therefore, calls for a regular and judicious application of manures.

The coconut responds to the application of nitrogenous, potassic and phosphatic manures, and more so in less fertile or poor soils. The response is seen more in the case of potassic and nitrogenous fertilizers.

The coconut should get 0.75 to 1.50 lb. of potash per tree per year. This may be applied in the form of 20 to 40 lb. of ash or one and a half to two pounds of muriate of potash or potassium sulphate. It should get nitrogen at the rate of 0.5 to 1.0 lb. per tree per year, given in the shape of three to four pounds of ammonium sulphate or 15 to 20 lb. of groundnut or other oilcakes. Phosphoric acid should be applied at the rate of half pound per tree per year. This may be done by

applying two pounds of bone-meal or superphosphate.

Artificial fertilizers, to be effective, should have enough organic matter in the soil. The organic matter is also essential to maintain soil texture and retain moisture. A great majority of our soils in which coconuts are grown lack this organic matter. To improve the situation, farmyard manure, compost or green leaves have to be applied in sufficient quantities. Farmyard manure or compost can be applied at 100 lb. per tree per year and green leaves at 6,000 to 10,000 lb. per acre. The easiest method, probably, to increase the organic matter of this soil is to grow a green manure crop of cow-gram, sannhemp and *dhaincha* or wild sannhemp and apply it into the soil.

Locally available manures such as the fish guano and prawndust are good sources of manures containing more than one manurial constituent and can very well be used.

COCONUT HUSK

Coconut husk is rich in potash, the most important manurial requirement of the coconut palm. In places where the husk is not used for extracting fibre from it and is cheap, it can be buried in trenches between rows of palms at the rate of 500 to 1,000 husks per palm.

Intercultivation in coconut gardens is of great importance. Digging the garden with spades or digging fork, ploughing, forming small mounds in August-September and spreading the mounds in December-January, or making shallow basins to a radius of about five feet at the beginning of the monsoon and filling them up at the close of the monsoon are some of the practices widely followed and recognised as highly beneficial to the trees.

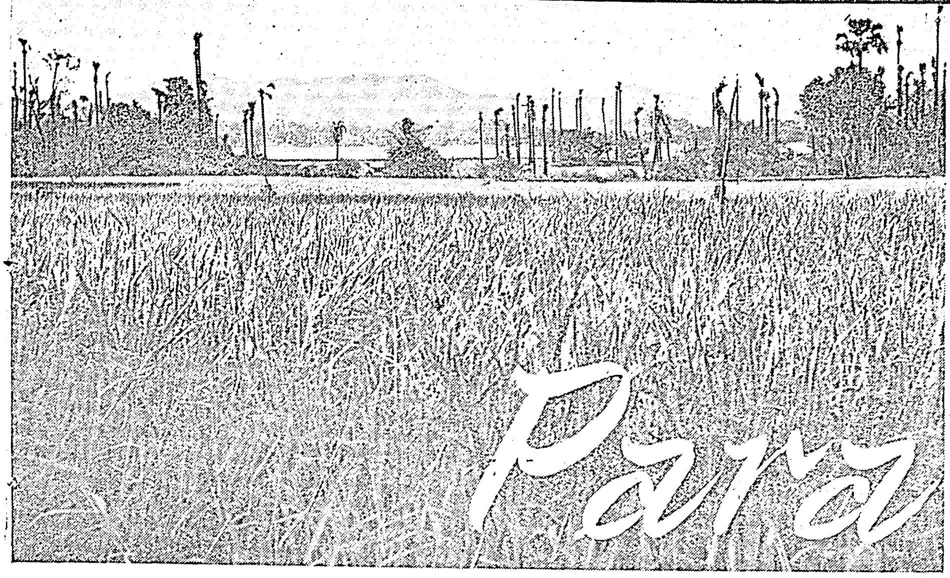
Production of nuts decreases if moisture is inadequate, especially so in plantations of sandy or sandy loam soils. Irrigation at proper intervals during the summer months is, therefore, advisable. Incorporating green manure crops or burying husks helps increase the water holding capacity of the soil and reduce the frequency of watering.

PEST CONTROL

Pests like the rhinoceros beetle and the leaf-eating caterpillar are serious pests of the coconut palm and are responsible for lowering the yields. The beetle should be extracted from the crowns of the palm with the aid of a beetle-hook and its breeding places, such as the manure pits and rubbish heaps, treated with BHC to destroy its grubs. The leaf-eating caterpillar can be controlled by natural parasites which the Agricultural Department of your state will do for you. The leaves of affected trees should be sprayed with DDT.

The leaf-rot disease is widely prevalent in many parts of the country and reduces coconut yields considerably. The disease can be controlled by spraying the crown and the leaves with one per cent Bordeaux mixture. The spraying should be done on a large scale. Each palm should be sprayed thrice, once before the onset of the south-west monsoon, a second time between the south-west and north-east monsoon and a third time after the north-east monsoon. Better cultivation and liberal use of potassic manures also reduce the incidence of this disease.

If you have enough rainfall or a swampy bit of land, try this fodder



Para Grass

A NATURALLY occurring grass, easy to cultivate and replace and supply a heavy yield of green fodder all the year round is being largely grown by dairy farmers in Bombay State.

The grass goes by the name of 'para grass' or mauritius water grass (*Panicum muticum* or *P.molle* or *P.barbinode*) and has been found to yield 13 to 15 tons of fodder to the acre. It is palatable as well as nutritious to cattle. It has also been found to be a good soil-builder. It is, however, suitable only to swampy and heavy rainfall areas.

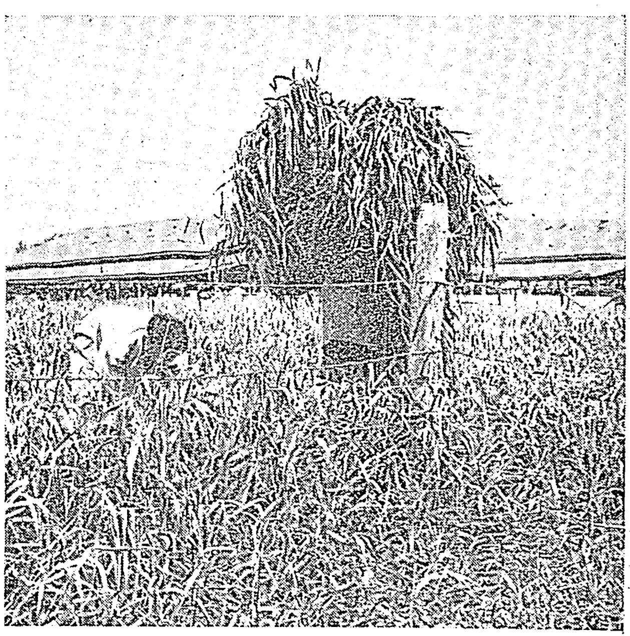
In Bombay, the grass has been found suitable for growing in the medium soils in areas of heavy rainfall. The grass is very much relished by cattle when it is young.

In Madras State, the grass has assumed an important place among fodders grown in marshy areas and under irrigated conditions. The grass is also grown abundantly for fodder on the livestock farms of Assam.

Para grass, in view of its potentialities, has been also tried on various state farms for trial with very encouraging results. In Bihar, the grass showed a very luxurious growth during the monsoon and has been responding very well to application of both organic and inorganic manures.

In Coorg, the grass showed a profuse growth. In summer, it was found to be a good cover crop and being spreading in its nature was found to prevent soil erosion. The grass has been found quite congenial to the soil, climate and rainfall of Manipur State where it has been giving a luxurious stand.

In Uttar Pradesh, para grass was found to be a very good grass but its liking for swampy or water-logged conditions will limit its wider use in this State. Rainfall in the State is restricted only to three months in the year. Trial with this grass in Hyderabad State also has given equally encouraging results. Here, it is found to respond very well to heavy irrigations and manuring.



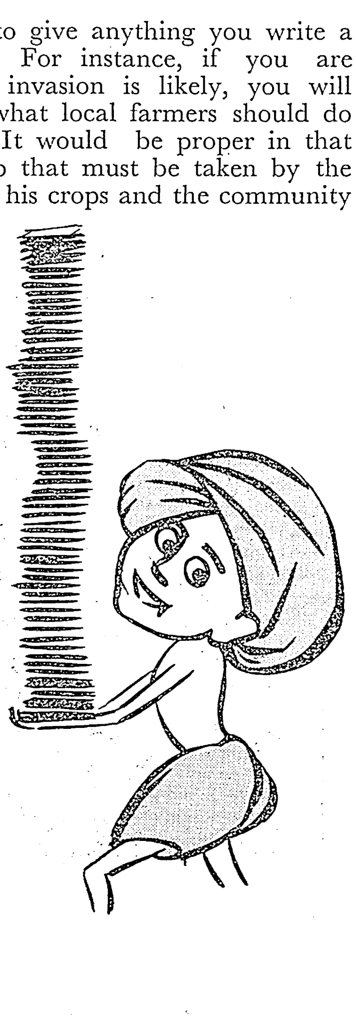
Para grass being cut and transported to feed cattle in one of Bombay's dairy farms

MAKE THE WRITTEN WORD WORK FOR YOU

Ways of telling a story and telling it attractively

IN helping villagers solve their problems it is advisable to make adequate use of all respectable newspapers and other periodicals reaching the villages where you work. The material that you contribute in these papers need not necessarily be news because many papers or periodicals going to villagers welcome even 'service-type' information, and this is the main type of message that you will have though in your work you occasionally make news and the paper will want to use this news.

However, it is well to give anything you write a 'news slant', if possible. For instance, if you are convinced that a locust invasion is likely, you will want to run a story on what local farmers should do when the locusts come. It would be proper in that case to outline each step that must be taken by the farmer in order to protect his crops and the community from these insects. The story can be made more interesting by pointing out in the very beginning that locusts are likely to come in the very near future, telling the source of your information, if possible.



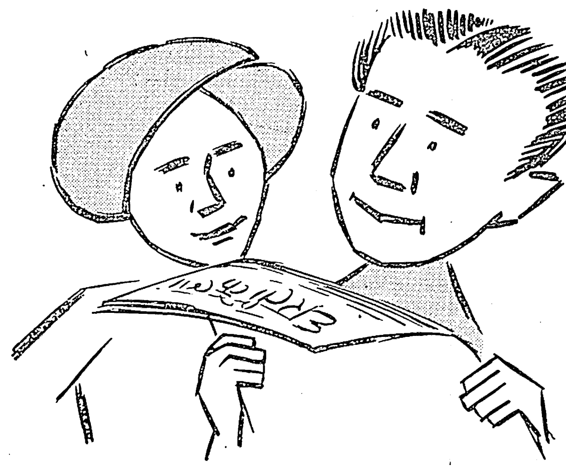
The story that you prepare should be written in the language of the village people who are reading the story, and in a way that they can easily understand it. The sentences should be crisp and paragraphs short. Moreover, all the details given in the story should be accurate. Timely publication of the story will further enhance its value. Since most of your stories will be the 'how-to-do-it' type it would be appropriate to tell the story by telling how some villagers succeeded with the improved job or practice at home. In any case, all stories that you prepare for the papers should be written to help people in your villages. Only rarely you might write a story which simply reports community activities such as a meeting, but even in this case the meeting will have been held to help solve some village problem.

KNOW YOUR EDITOR

If possible, you should acquaint yourself with the editors of all the papers coming into your villages. In case you do not think it possible to prepare stories yourself for the paper, let your editor know your problems. It is very likely that he will try to impress upon you that writing for the newspaper is not difficult for a literate man. Having got acquainted with your editor and having received his assurances that he would be interested in your material, prepare a brief story and let him look at it. If he does not accept the story straightaway but he is interested in serving his readers, he will tell you his reasons for not accepting the story and how you can prepare another story that he will accept. It is almost universally true that after a short period of introduction, alert newspaper people will seek the village worker and insist that he continues giving material for the papers. Sometimes the editor will become so interested that he will prepare much of the material himself. In the beginning, however, the village worker must take the initiative.

If a village worker is in villages that do not have enough newspapers for his use, he will be doing a service to his people if he introduces good rural magazines or papers. There are a number available, written in simple local language that can help the village worker do his job better.

In teaching, literature is the basis for any teaching programme. In Extension teaching, simple leaflets and pamphlets are valuable and essential tools in



the hands of the intelligent village worker. The leaflet, in India, is a single sheet of paper folded to make a four-page piece of printed matter. However, a leaflet can be printed only on one side, printed on two sides of folded sheet, or folded five or six times with printing on all sides. The leaflet usually treats one job or one small problem; it gives a process, or procedure in great detail. The best leaflets are those which give accurate and specific instructions on how to do a job.

BRIEF AND SIMPLE

A pamphlet or bulletin, on the other hand, may contain many pages and treat a number of topics or steps in a given problem. The best pamphlets are brief and simple and without such information as would be irrelevant to the problem treated.

The village worker should make every effort to obtain as many pieces of literature for his use and reference as possible. If arrangements can be made, enough copies of the same circular or leaflet should be secured for passing around or lending these on to the interested villagers at each meeting or demonstration. In case it is feasible and practicable for him to have leaflets printed or cyclostyled for his own use in the village, the simple rules given hereafter may be followed. It is hard to write for easy reading. But it has been proved in many reading tests that the easier your writing is, the more it will be read.

Only one simple idea, such as fertilizing sugarcane or using the best wheat seed or selecting laying hens, should be treated in a leaflet. Only those subjects or jobs that are of interest to the villager should be selected. In writing a leaflet, the villagers' language should be used. The paragraphs should be short and too much material should not be crowded on a page. Make sure that your longest sentence is not over 15 words, average sentence has 10 words or less and most of the words in each sentence are of one syllable, few of them, if any, being over two syllables. Illustrations and pictures which are easily understood may be used. The instructions given in the leaflet should be complete, yet simple, and should be thoroughly checked for accuracy.

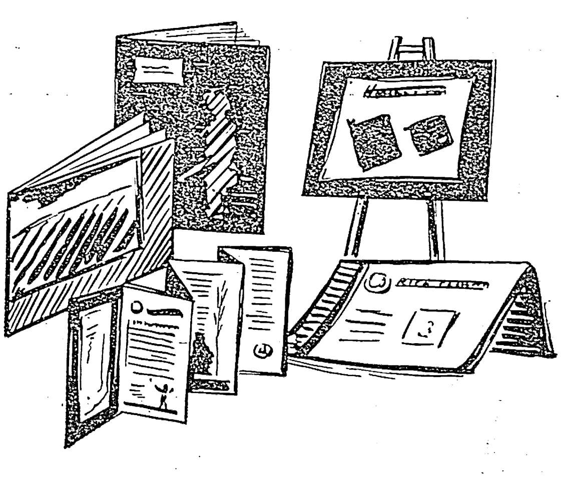
CIRCULAR LETTER

One of the best teaching devices that can be used is a circular letter, a letter which is reproduced and sent with the same information to many people. To village people, even partly literate, receiving a letter can be very important. Naturally, receiving such mail will have great influence. However, the value of a letter will depend mostly on how well you write it.

The best letters will be brief, simple, clear and have a single purpose to convey. They should have complete information and be an effective part of your programme or campaign, and lead to action. So they must have short sentences and short paragraphs, with a personal touch in them. The reason for a personal touch is that the reader will be more interested. This interest can be aroused in many other ways, but each letter must arouse interest, possibly in the first sentence. For example,

> "Dear Friend,
>
> I notice that you attended our meeting last week. In this meeting we discussed controlling mosquitoes. A number of suggestions were made. One suggestion, as you may recall, was to clean the tank and place in the tank young fish. These fish will eat mosquito eggs. This will cut down the number of mosquitoes. In this way we may control malaria. Your committee has decided to meet again next Friday at 7'O clock. At this meeting we will discuss ways to clean the tank. Would you come and give us your ideas?"

Circular letters can teach and save time for the village worker. They can be inexpensive, if their production and despatch is planned properly. If you cannot get a cyclostyling machine, enlist the assistance of the school master. He can allow his students to copy your letter and pass them out to the villagers.—*From the forthcoming publication "Extension Guide for the Village Worker"*



Well-rounded, closely-formed curds of an attractive white colour and magnificent quality—this is what the new variety offers you

the new cauliflower with a future

by

H.B. Singh and S.M. Sikka

VEGETABLE-GROWERS in northern India will now be able to raise a crop of cauliflower early in the season, thanks to the efforts of the Indian Agricultural Research Institute, New Delhi. A new early variety of cauliflower, yielding well-rounded, closely-formed curds of an attractive white colour and excellent quality, has been recently evolved at this Institute.

An outstanding feature of this variety, which closely corresponds to the commonly grown *Katki*, is that the proportion of poorly-heading plants is negligibly small, and an average curd weighs two and a half pounds, though curds weighing four pounds have also been obtained. Another important characteristic of this variety is the uniformity in the emergence of the curd.

Cauliflower is extensively cultivated in northern India as an important vegetable crop, so much so that cauliflower produced in this part of the country is marketed to places as distant as Calcutta and Bombay. The profitable growing of cauliflower, as also of other vegetables, however, depends a great deal on raising an early or a late crop. The production of an early crop is even more important because by doing so the vegetable-growers can realise a much higher market price for their produce.

METHOD OF CULTIVATION

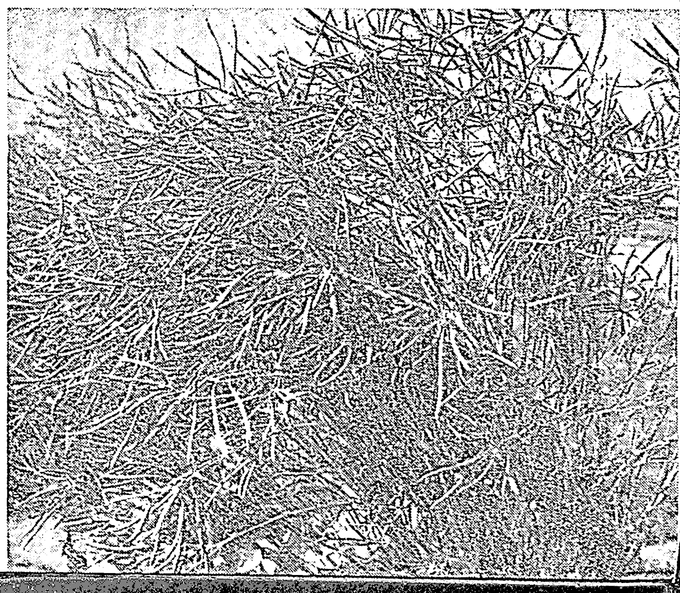
The nursery of this variety is sown in the month of July on raised seed-beds which are heavily manured with well-rotten cow-dung. A convenient size of the nursery bed is 6 ft. $\times$ 3 ft. Generally six to eight ounces of seed is enough to raise a nursery for planting an acre. The seed should be sprinkled uniformly over the seed-bed, the surface of which has been well compacted, and thereafter covered with a very thin layer of a mixture of fine earth and sifted farmyard manure. The seed-beds should be kept moist by sprinkling water with a rose-can once or twice daily, depending on the weather. It is desirable to provide shade during the hotter part of the day in the pre-monsoon period and give protection from heavy rain afterwards. At no time should the seed-beds be allowed to submerge in water, as in that case the young seedlings are likely to be killed.

Compact curds of an attractive white colour are characteristics of the new variety

The seedlings will be ready for transplanting in about four to six weeks after sowing. The field in which the seedlings are to be transplanted should be thoroughly cultivated by ploughing three to four times with a country plough. Well-rotten farmyard manure should be added to this field at the rate of at least 20 cartloads per acre. The seedlings can be transplanted on ridges or in flat beds keeping a distance of two feet from plant to plant and row to row. Addition of ammonium sulphate at the rate of three maunds per acre during the growth period will prove very beneficial to the crop. To get the best results, it is preferable to sprinkle the fertilizer near the roots of the plants at short intervals. In case there is no rain the field should invariably be irrigated after the application of the fertilizer.

Regular hoeing of the crop is of utmost importance to keep down weeds and to loosen the soil. Four to six hoeings before the curd-formation starts are considered adequate. With each hoeing, the lower portion of the plants should be well earthed up. This operation is very essential as otherwise the plants do

The new cauliflower in seed



not become fully stocky. The crop has to be frequently irrigated at intervals of a week to 10 days, particularly during the post-monsoon period.

RAISING SEED

The new variety has been observed to be a good seed-producer under Delhi conditions. Seed can be raised on selected plants which may either be allowed to flower in their original position or transplanted in a separate plot. The latter method is to be preferred as it permits greater care of the plants and also helps in effecting saving in space. If the transplanting method for raising seed is followed, the selected plants should be planted at a spacing of $2\frac{1}{2}$ ft. $\times 2\frac{1}{2}$ ft. Utmost care has to be taken in uprooting the plants selected for raising seed, as any injury caused to the roots adversely affects their growth and subsequent seed-setting.

The developing pods have to be protected from damage by parrots and other birds. The pods should be harvested at intervals soon after they become ripe. This will avoid any loss of seed through natural shattering of pods. The quantity of seed produced per plant varies with the care taken in the initial stages. In the crop grown at the Indian Agricultural Research Institute, the quantity of seed per plant varied mostly from half to three-fourth of an ounce, though from some plants as much as two ounces of seed also was obtained.

As cauliflower is self-sterile, the home gardener has to take care that he keeps at least two selected plants for raising seed, as otherwise fertilization of flowers will not take place and no seed will be obtained. Another precaution that has to be taken is that the selected plants grown for raising seed should be well isolated from other crops of the mustard family, particularly cabbage and Brussels sprouts with which cauliflower crosses freely. If this crossing is allowed to take place, the plants raised from the resultant cauliflower seed will be characterized by 'bolting', which is a serious defect of this crop.

As a green fodder or hay few grasses can beat

'DAL' GRASS

by

H. N. Dev Goswami

FEW Indian grasses contain about 30 per cent of crude protein at the young growing stage which does not decrease beyond six per cent at its worst stage. It is also doubtful if there is any Indian grass which is 90 per cent edible at its worst stage either as green fodder or hay.

Hymenachne amplexicaulis Nees is one such grass. In Assam, the grass is locally known as *dal*, *karanga dal*, *bhat dal*, *dhuri dal*, *dhop dala* and *tattu*. In Manipur State, it is called *taboo*. It is a perennial short-erect aquatic grass. It shoots up from a creeping root-stock and roots at the lower nodes. The stem and leaves are very soft. The stem also contains a white spongy pith, which is generally used by children for making garlands.

The grass *Hymenachne amplexicaulis* Nees is perhaps indigenous to Assam, where it usually is found to grow in *beels*, *holas* and marshes. It grows well up to two to three feet above the water level, but can thrive even up to a depth of five to eigth feet. During the latter part of the the winter, it goes either dry or remains dormant. With the advent of the monsoon, it shoots from its rootlets and is collected from May onwards. It flowers in Novermber-December and becomes scarce from January. Surprisingly, even at a late stage in December, the dry matter content of the grass does not increase above 30 per cent, and it contains about six per cent of crude protein and is 90 per cent edible either as hay or green fodder.

Hymenachne amplexicaulis Nees can easily be propagated in the field by its runners or seeds. Propagation by runners is preferable as the grass grows well in a short period. As it roots and shoots from the lower nodes and has a creeping habit, it multiplies itself and covers more area year after year.

For the cultivation of this grass, a low land where water

accumulates during monsoon, should be selected. It may also be cultivated on the edges of fallow tanks. The land should be ploughed twice or thrice in the month of June and should be puddled. In the case of poor soils, 10 to 15 cartloads of well-decomposed farmyard manure may be added per acre. The runners should then be planted at a distance of two feet apart from plant to plant and row to row. In case of cultivation on the edges of tanks, runners may be planted by digging holes. The runners will firmly set within a week or two and will give shoots from the nodes. It will then grow quickly with the monsoon and cuttings will be available after two and a half months of the planting. Successive cuttings may be available after each one and a half months' interval. Three to four cuttings may thus be obtained.

TAKE CARE OF WEEDS

The grass requires not much of after-care. The only care necessary is to keep the area free from the invasion of weeds, especially the water hyacinth, which easily stifles it. Manuring with five to ten cartloads of well-decomposed farmyard manure per acre in the month of January or February each year enhances its growth and yield.

During the year of planting, two cuttings are generally available yielding a total of about 200 to 250 maunds per acre. In the succeeding years, however, the yield generally rises to about 500 to 600 maunds of green grass in four cuttings with 15 to 20 per cent of dry matter. If it is cut only once in October the yield per acre will be about 400 maunds with about 25 per cent of dry matter.

The grass is a common feed for cattle, buffaloes, horses, mules and elephants. In the early stages, however, the grass is not much relished by animals, especially cattle. This is possibly due to the fishy smell which the grass has at this stage. At the prime stage or beyond that the grass is much relished by animals. Buffaloes of the low-lying areas of Assam mostly depend on this grass for the major part of the year. The mahouts are also seen to collect this grass from distant places and in large quantities to feed their elephants. Cartloads of this grass are often found selling in the towns of Assam at not less than a rupee a maund.

If cattle or buffaloes are exclusivele fed on this grass at its early stage, their faeces become loose. This is probably due to the presence of a high percentage of chlorophyll and other colouring matter in the stuff. This can, however, be rectified by adding a few pounds of straw or dried grass to the principal diet. The grass when converted into hay does not produce any bad effects.

RELISHED BY CATTLE

Digestibility trials carried out with this grass at the Animal Nutrition Research Laboratory, Khanapara, Assam, revealed that even at its flowering stage, the grass is much relished by cattle. The animals consumed on an average 2.6 lb. of dry matter per 100 lb. of body-weight. It was found that 100 lb. of the material contained 1.46 lb. of digestible protein and 12.45 lb. of starch equivalent. The grass, therefore, is in no way inferior to many of the cultivated fodders of India such as maize, Guinea (young), Napier, *jowar*, *bajra*, etc., at least in so far its organic nutrients are concerned.

Metabolic experiments conducted with the hay prepared from both early cut and late cut *dal* in the same Research Station showed that both these are much relished by cattle. The animals under experiment consumed over two pounds of dry matter per 100 lb. of body-weight.

The early cut hay was found to contain 7.1 lb. of digestible protein and 32.5 lb. of starch equivalent per 100 lb. of the raw stuff, whereas the late cut hay was found to contain 2.72 lb. of digestible protein and 26.35 lb. of starch equivalent per 100 lb. of the hay. The grass, therefore, is considered superior even as hay to most of the indigenous grasses used for making hay in India.

BETTER AS HAY

The only drawback of the grass is that it is poor in some of the essential nutrients like calcium and even *ad libitum* feeding cannot assure positive balance on adult animals at rest. If, however, it is conserved as hay in the early stage it is found to assure a calcium balance.

The easy propagation, negligible after-care and high nutritive value of the grass *Hymenachne amplexicaulis* Nees, in spite of its low mineral content may be recommended for utilisation as cattle feed both as green (from pre-flowering stage) and hay (at all stages of growth) for economic supply of digestible crude protein to cattle and more especially to milch and growing stock.

WHAT'S NEW IN FARMING

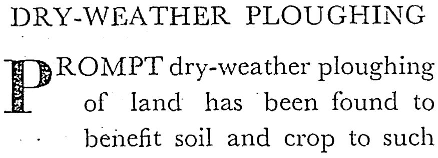
DUCKS CONTROL SNAILS

DUCKS, when reared on the farm, not only add to the income of the farmer, but also help keep some internal parasites of domestic animals away by destroying snails in water sources and other places on the farm.

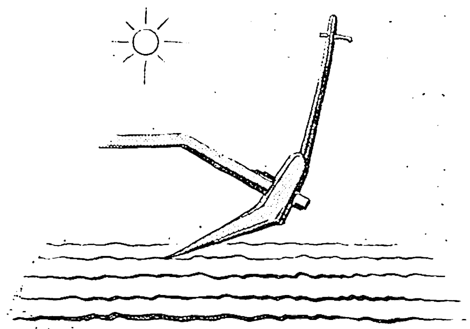
Snails are carriers of such parasites as flukes, liver flukes and blood flukes, which infect farm animals and cause serious disorders in them.

At the Helminthological Research Centre in Madras, it was noticed that when ducks were reared, the snail population went down.

So far, hand-picking and chemical destruction were the two methods prescribed for checking snails on the farm.



DRY-WEATHER PLOUGHING



PROMPT dry-weather ploughing of land has been found to benefit soil and crop to such an extent, that it is being recommended for wide adoption all over the country.

At present, very few farmers resort to dry-weather ploughing. When the monsoon crops have been harvested, land has to be ploughed without any delay to get the full benefits of the operation.

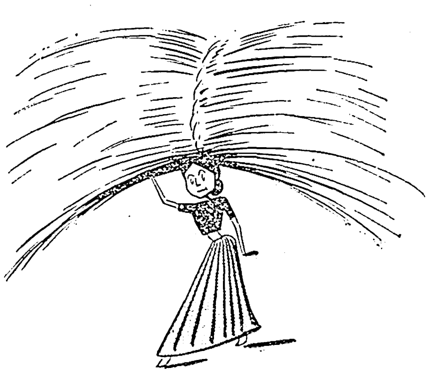
The ploughing not only loosens the soil which otherwise would get hard and unworkable, but also increases the capacity of the soil to absorb and retain moisture. Harmful insect pests and their eggs get destroyed by being exposed to the sun's heat or being eaten away by birds. Weeds also get dried out and killed. And, more important, it permits the farmer to sow his crops at the right time. Sowing in the rainy season can begin in time only if the land has been ploughed and made ready during the dry season. The crop will have sufficient time to grow properly and produce a higher yield.

PERENNIAL FODDERS

THE growing of perennial fodders wherever facilities exist for their cultivation is being pointed out as one sure way of increasing milk output in the country by providing a richer forage to milch cattle.

For growing irrigated grasses, a loamy soil with facilities for irrigation and drainage is best suited. This is what the Madras Department of Agriculture has been recommending to farmers regarding cultivation of grasses:

To get best results, land has to be ploughed four times, twice with an iron plough and the rest with the country plough, to give a good tilth. If necessary, clods should be broken with mallets. Where there is no sullage or sewage irrigation, well-decomposed cattle manure should be applied at 25 tons per acre, spread and covered by working a country plough. When rapid growth is desired, 25 to 50 lb. of ammonium sulphate can be applied through the irrigation water. The soil should be then thrown into ridges and furrows 2½ ft. apart with the help of a ridge plough or with human labour.



The best time for harvest is just before the grass flowers. If too early, the out-turn will be affected and if late, the quality of grass deteriorates. Experience will tell how much the interval between two harvests should be.

The yield of grass improves from the date of first cutting and remains at the same level for six months. A daily supply of grass can be maintained by dividing the plot into strips and cutting the grass systematically at suitable intervals.

GROUNDNUT HAULMS

GROUNDNUT HAULMS can be a good source of forage for cattle. The crop being a legume, is richer in proteins than millets and cereals.

Experiments conducted in Mysore showed that when haulms were allowed to partially dry in the open and then stacked and allowed to cure, a rather dark-coloured hay was produced, highly acceptable to cattle. The hay was found to be as good as of berseem and cowpea.

In curing, it was found advantageous to handle the produce early in the day, and that too as little as possible. Frequent handling in dry weather resulted in the breaking up of tips and the shedding of leaves.

Ordinarily, a dry crop yields 2,000 to 3,000 lb. of haulms per acre, but with the improved varieties evolved by the Agricultural Department in Mysore, higher yields ranging between 3,000 and 7,000 lb. are being obtained.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More farmers are taking to Sesbania-growing as a cheap but efficient method of manuring crops

Nothing To Beat Sesbania

by

P. Y. CHINTAMANI

SINCE the last two years, farmers in Madras State have been sowing sesbania (*S'sbania speciosa*) as a green manure on an unprecedented scale.

For doing so, they have a good reason. Sesbania has been giving high per-acre yields of the green matter, averaging from 30,000 lb. to 50,000 lb. The highest yield was 86,400 lb. per acre recorded at the Agricultural Research Station at Samalkota. It is claimed that 10 lb. of seed sown in an acre gives enough green manure for six acres of paddy land.

During 1952-53, when the south-west monsoon was a failure and a severe drought prevailed, paddy lands in Peddapuram (East Godavari) were scorched, but the sesbania plants raised on the field bunds showed no effect of the drought. Experience elsewhere has also been similar. Sesbania is not only drought-resistant, but also has another happy trait. It withstands prolonged submersion.

Sesbania first came to Madras State in 1935-36. The small quantity of seed received from the Economic Botanist, Kew Garden, London, became the nucleus for rapid multiplication for trial on the State's research Stations.

SLOW IN EARLY STAGES

Sesbania has a slow growth in the early stages and after a month it grows faster if moisture is available in the soil. Because of its slow growth in the early stages, it gives smaller quantity of green leaf if cut at this stage. It yields well, however, if a longer interval is given. At the Agricultural Research Station at Maruteru, sesbania gave as much as 25,000 lb. of green stuff in 80 days' time.

The crop is neither well-relished nor grazed by cattle as they do on *dhaincha*. Sesbania rots quicker than *dhaincha*. It comes up better in alkaline soils than *dhaincha*. Under such conditions, sesbania gave 11,000 lb. of green matter as against 9,000 lb. of *dhaincha* at Maruteru. As an off-season crop, it proved superior to indigo and wild indigo.

Another point in favour of sesbania has been its low cost of production. At the Maruteru Station, the cost of production of 1,000 lb. of green leaves worked out to Rs. 0-2-5 to 0-3-6 for sesbania, while it was Rs. 1-0-4 to 1-7-0 for sannhemp, Rs. 0-15-9 to 1-0-6 for *dhaincha* and Rs. 0-4-7 to 0-4-9 for *pillipesara*.

Farmers are very much impressed with the performance of sesbania and, as advocated by the Agricultural Department, are raising the plants on the field bunds. Since the seed coat of sesbania is rather hard, germination becomes rather slow, taking five to six days for the process. However, pounding the seed after mixing it with some sand is supposed to facilitate early germination. I found that if the seed is tied in a cloth and immersed for five minutes in water brought to the boiling temperature and removed from the fire, then dried over-night and sown the next morning, the seed not only germinates by the third day but also gives a good germination percentage.

PLANTING SEEDLINGS

From the experience that I have had of sesbania in Peddapuram, I can say that not only the age of seedlings but also their size at planting time has a bearing on the growth and production of seed. By sowing the nursery thin and planting two-month old seedlings of about a foot in height, best results are obtained.

Sesbania seedlings planted along with paddy do come up very well, giving profuse branching and good podding. For this purpose, sesbania nurseries should precede paddy nurseries by two to three weeks.

When three-month old and about three feet high seedlings were topped and planted, a few did not get established, while the rest branched profusely and gave a good yield of seed. This shows that topping the seedlings after they are a foot or more taller than the paddy crop may be tried with success.

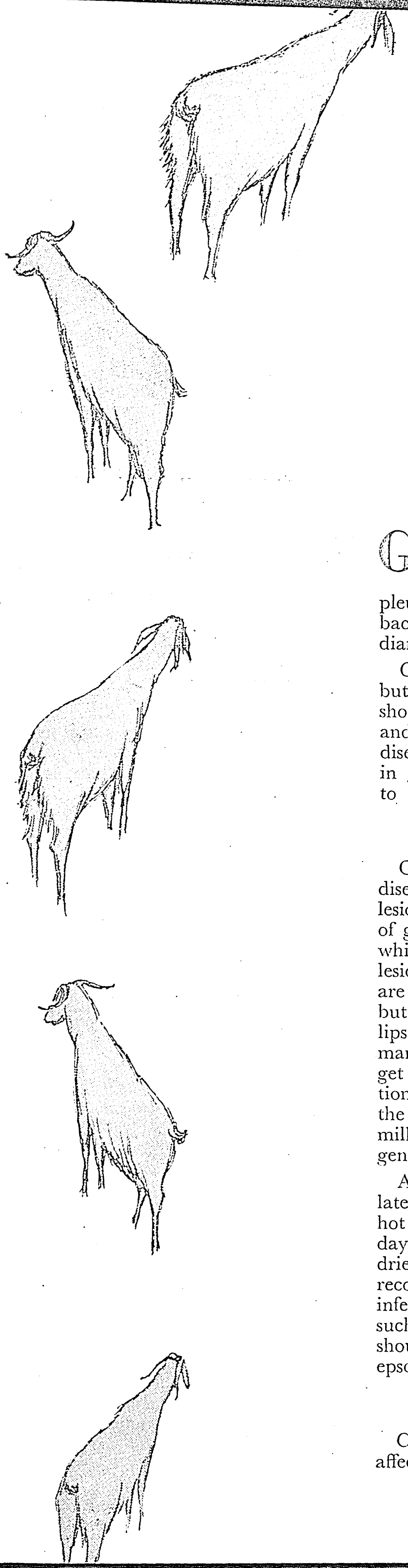
The viability of the seed seems to be very good. In course of time it is likely that this crop becomes a self-sown crop.

Sesbania, excepting for its slow growth in the early stages, has many advantages over other green manures. The following are some of the important recommendations being made by the Madras Agricultural Department.

In single crop wet lands, sow 10 to 15 lb. of seed a week or ten days before the harvest of paddy. This gives sufficient green leaf by July, if there are good summer showers, to manure five to six acres from one acre of the crop. Six to seven-week old seedlings also can be planted along field bunds just a week before paddy harvest. These will establish themselves and come up well with the summer showers.

For double crop wet lands, raise thin nurseries by sowing $\frac{1}{4}$ lb. in one cent of land, and plant the seedlings two to four inches apart in the puddle along the bunds at the time of planting paddy. By four months the plants will grow up to 10 ft. and give four to six cartloads of green matter per acre. This can be puddled immediately, or if there is sufficient gap between the first and second crops, the plants can be cut, dried (without decomposing) and applied to the second crop. A few plants may be left over for the collection of seeds.

Recent experiences at the Agricultural Research Station, Maruteru and Anakapalle show that sesbania gives a good yield of green matter in a period of 80 days and the crop can be raised in the Deltas even where the duration between the crops is short.



WHEN GOATS GET SICK

Goats are hardy, but they get sick just as other animals do

by

H.K. LAL

GOATS get sick just as any other animals do. They suffer from goat-pox, contagious pleuropneumonia, parasitic and bacterial pneumonia, indigestion and diarrhoea.

Goats are naturally very hardy, but the flock-keeper nevertheless should guard against these diseases and treat them whenever there is a disease attack. A heavy mortality in goats sometimes also occurs due to parasitic infection.

GOAT-POX

Goat-pox is a fairly common disease and can be detected when lesions are seen on the udder of goats in milk, especially in those which have recently kidded. The lesions, in the form of round nodules, are present on the teats and udder, but may spread to the mouth or lips of the suckling kids. The man who milks the goat may also get sores on his fingers. The condition of the udder being painful, the goat offers resistance to milking. The milk yield also generally goes down.

Affected animals should be isolated. The udder must be given hot fomentation at least twice a day and the udder thoroughly dried thereafter. To hasten recovery and to prevent secondary infection, a mild antiseptic ointment such as sulphanilamide ointment should be applied. A dose of epsom salt twice a week is useful.

PLEUROPNEUMONIA

Contagious pleuropneumonia affects goats of all ages and is a serious disease. Animals suffering from it have cough, sneezing and give out a nasal discharge. Other general symptoms such as loss of appetite, etc., are also seen.

Such animals should be isolated and given proper care and nursing. Some organic arsenic preparations have been found to cure the disease. A vaccine is available which can, if used, immunize the animal to the disease. The vaccination, however, should be got done by contacting the nearest Veterinary Officer in the area.

ANTHRAX

Another serious disease that appears suddenly and takes a heavy toll of goats is the disease called anthrax. Since the disease is communicable to human beings also, extra precautions are necessary in dealing with the disease.

The outbreak of the disease usually occurs when goats are on pasture and animals die sometimes within a few minutes of infection. It is observed that the disease follows a hot dry summer when there is a scanty growth of herbage.

Anthrax usually occurs in an acute form and causes unsteady gait, trembling, restlessness, difficult breathing, bloody discharges from the natural body openings and convulsions, followed by death.

In case of an outbreak of the disease, the animals should be got vaccinated with the help of the nearest Veterinary Officer.

FOOT AND MOUTH

Yet another disease that affects goats is the foot and mouth disease. It is characterised by the formation of blisters on the mucous membrane of the tongue, lips, cheeks, palate and other tissues of the mouth and on the skin between and above the cleft of the feet. It is found that the foot lesions are more common than the mouth lesions. At times diarrhoea and pneumonia also occur.

The disease generally appears in the hot months or in the rainy season. Affected goats should be isolated. The lesions in the mouth should be washed with potassium permanganate, while the foot lesions should be dressed with phenyle or copper sulphate lotions. To prevent the disease from spreading, goats must not be moved from place to place whenever there is an outbreak.

TUBERCULOSIS

At one time the goat was supposed to be immune to tuberculosis, but recent investigations show that the disease does occur in goats, especially when they are kept in large numbers and closely herded together. As such it will pay the owner of a large flock to have the animals tested from time to time for the disease.

JOHNE'S DISEASE

Like tuberculosis, Johne's disease is sometimes found attacking goat flocks. The disease is very slow in its course and in the beginning goes unrecognised. When it comes, well-fed animals are found losing flesh and doing badly but no signs of fever, cough or loss of appetite are seen. Later, they suffer from periodical attacks of diarrhoea which increases in severity and frequency until the animals become terribly emaciated and die of starvation. Such cases must be brought to the notice of the Veterinary Officer in your locality for advice.

PNEUMONIA

An ordinary cold in the goat sometimes gives rise to pneumonia. The disease may also be caused by the goats being sent on long journeys by train or on foot when conditions are not favourable.

Animals suffering from pneumonia show a high temperature, loss of appetite, hard breathing and sometimes cough. Such an animal should be shifted to some dry, warm place where plenty of fresh air without draughts is available. Plenty of fresh drinking water should be given to the animals and dry and hard foods avoided. The animal must be carefully nursed and given soft or liquid nourishing food, in small quantities and at frequent intervals.

INTERNAL PARASITES

Most serious losses occur among goats due to internal parasites. Though deaths are not infrequent, economic losses are great when there is an attack from these parasites because of the loss of condition, unthriftiness, anaemia and other adverse effects. In terms of money all this will mean lakhs of rupees per annum.

The important internal parasites found in goats are round worms, tapeworms, flukes and protozoa which infest the internal organs such as the rumen, large and small intestines, liver and lungs.

When goats are infected with worms, a loss in weight, diarrhoea, anaemia, paleness of the mucous membranes of eyes and mouth, development of a pot belly and quite often a soft swelling under the jaw, are very commonly seen.

Before embarking on treatment for the worms, the flock owner must know what the parasite is. A complete control of the parasites can be assured only by a periodic use of suitable drugs.

Various drugs such as phenothyazine, carbon tetrachloride, arecanut, extract of male fern, oil of turpentine and copper sulphate have been found effective in the treatment for these parasites.

Pheno-thyazine is becoming extensively popular because of its effectiveness and cheapness. The dose recommended by the manufacturers is 15 gm. per goat of average size for routine periodic treatment and 25 to 30 gm. for curative treatment.

The following mixture, which is quite cheap and easily prepared, has proved to be a good preventive for sheep at the Government Livestock Farm, Hissar, and can be safely recommended for extensive use to all goat breeders:

Copper sulphate	8 oz.
Powdered mustard	4 oz.
Water	Sufficient to make up three gallons

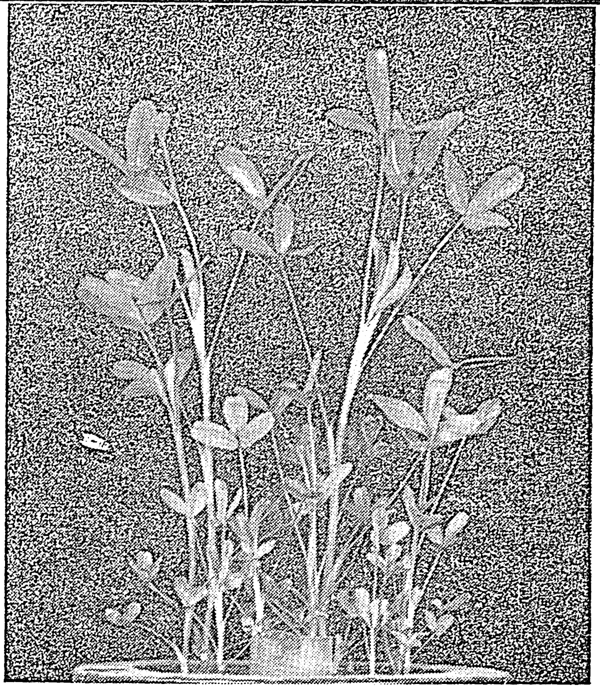
The solution should be freshly prepared and the ingredients properly dissolved. Two to two and a half ounces should be given once a month according to the size of the goat.

'PITTO' OR 'GILLAR'

Goats often get a disease called *pitto* or *gillar*. The infection occurs due to heavy infection by an immature parasite. The affected animals become dull, weak and anaemic with pallid mucous membranes. In advanced cases, a swelling of the throat is present which appears in the evening and considerably subsides in the morning. Later on, persistent foetid diarrhoea develops. Sometimes there is also a rise in temperature and the animal dies within a period of 10 to 15 days while in other cases there is sudden death, such cases being usually of heavy infection. Treatment with copper sulphate and carbon tetrachloride has given encouraging results but it should be carried out by a veterinarian.

Goats and kids in particular are prone to lice and should be protected against this pest by use of Gammexane which should be used in prescribed strength as dusting powder or as dip.

The mortality among various breeds of goats due to diseases is not so high in adult goats, as it is in kids. The mortality is less in non-milch breeds than in milch breeds, where, again, the incidence is higher among heavy-yielders. In kids, the mortality is more in winter than in the summer. Digestive and respiratory diseases are a common cause of mortality in the kids and uterine diseases in goats, especially in the first kidders. Special precautions are, therefore, required to be taken in rearing kids.



Berseem performs multiple duties

by
B. D. Ganguly and
L. L. Relwani

Experiment brings to light new and interesting facts about an old crop

BERSEEM (*Trifolium alexandrinum*) grown for forage is a popular and ideal winter crop. It is a nutritive green fodder, particularly rich in protein, containing three to four per cent nitrogen (about 20 to 25 per cent protein) on the dry matter. When sown early, it is available in late November when other *rabi* fodders, viz., oats, peas, *methra* and *senji* have not made sufficient growth, and continues up to the end of May when these *rabi* fodders are over and *kharif* fodders such as cowpea, *guar*, *moth*, maize and *jowar* are not yet ready. No surprise, therefore, that berseem occupies a prominent place in the farm economy of the irrigated areas of the Punjab, Delhi, Uttar Pradesh and parts of Bombay. Its ease in culture, luxuriant growth and dependable productivity under variable climatic conditions on a wide range of soils have favoured its recognition as a valuable six-month fodder crop in these parts of India.

Besides supplying regular requirements of rich, palatable and succulent fodder for both work and dairy animals, berseem enriches the soil by fixing considerable quantities of nitrogen from the air. Its vigorous root system improves aeration and the water-holding capacity of the soil and also increases its organic matter status. Berseem adds plant residues to the soil and improves its capacity to release some of the plant nutrients in an available form. The luxuriant vegetative growth of this legume fully covers up the ground, thereby suppressing the weeds. Due to frequent cuttings, it does not harbour insects and smothers the existing ones. Thus, berseem is a nitrogen-fixer, a weed suppressor, a soil conserver, a soil restorative, a medium for reclamation of alkali soils and an excellent nutritious fodder. It also offers the advantages of a green manure crop without its having to be buried. It is, therefore, far more economical to grow berseem in a rotation than raise a green manure crop in an irrigated tract.

METHOD OF CULTIVATION

Berseem grows best on well-drained medium loam calcareous soils rich in phosphates. Acid and damp soils are unsuitable for its growth. Ten to twelve irrigations are generally necessary. The sowing period extends from the third week of September to the end of October. Yield decreases if the sowings are delayed as the growth period is reduced resulting in a less number of cuttings. It is always advantageous to mix berseem seeds with Rhizobia bacterial culture before broadcasting them in the field, as these bacteria

live in the nodules of berseem roots and fix 150 to 200 lb. of nitrogen per acre from the air. Ten to twelve seers is a good seed-rate. Bright yellow and plump seeds should be sown. Immature and brown seeds should be discarded. The seeds should also be free from *chicory* (*Chicorium intybus*), a troublesome weed commonly found in berseem fields.

The crop gives about five to six cuttings and yields 500 to 600 maunds of green fodder per acre. Under favourable soil-climatic conditions, it is capable of giving more than 1,000 maunds of green fodder per acre. The first cutting is usually taken about one and a half months after sowing. Later on, a 30 to 35 days' average interval is the best for effective growth and maximum dry matter formation. Shorter intervals and close cuttings adversely affect the sprouting capacity of the crop. Too long intervals make the fodder fibrous and unpalatable besides causing reduction in ash, protein and phosphorus contents.

Since the berseem has only a few shoots at the time of the first cutting, it is better to grow rape along with berseem. Rape has a quick vegetative growth and the mixture provides a high fodder-yield in the first cutting in the month of November, when there is acute fodder scarcity. With the setting in of spring, the vegetative growth is accelerated for about two months and cuttings can be taken at shorter intervals. Late in the season, the hot and dry May weather affects the succulence and shoot-emergence of the plants, resulting in lower yields.

Berseem is one of those rare forage crops which can be allowed to set seed after yielding fairly good quantities of fodder. For seed-formation, the last cutting should be taken by the end of February or beginning of March and the crop allowed to seed. If the duration between the last cutting and seed maturity is short, immature seeds will be formed. Besides, if the crop is left to seed late in the season, when the hot and dry winds have set in, flower-formation will be affected and also the number of bees responsible for flower pollination will be reduced. This will result in defective seed-setting and lower yields.

The nitrogen nutrition of berseem is chiefly done by Rhizobia living in its root nodules. The plant supplies them with ready-made carbohydrates and they in return fix nitrogen from the air and supply it to the plant. Phosphate when placed in the soil is absorbed by the roots and is also utilized by the bacteria. Hence, the supply of additional phosphate further stimulates nitrogen fixation resulting in a vigorous vegetative growth and a strong root system.

RESPONSE TO FERTILIZERS

Experiments conducted at the Indian Agricultural Research Institute, New Delhi, indicate that berseem responds favourably, both in yield and quality of fodder, to phosphatic fertilizers, particularly ammonium phosphate, superphosphate and basic slag. The residual effects of ammonium phosphate applied to berseem also increased the yields of wheat and maize in the rotation. Besides phosphatic manuring, application of boron at the rate of 5 to 10 lb. or molybdenum in the form of one pound sodium or ammonium molybdate per acre, considerably increased the fodder as well as seed-yields. Probably due to greater yield of berseem roots and greater quantity of nitrogen fixed from the air, the residual effect of these on the succeeding wheat crop was also beneficial.

Experiments carried out on alluvial soils at Karnal indicate that whereas berseem yields improve significantly by the application of superphosphate, increase in the yield due to bone-meal, even at such high level as 120 lb. per acre, is meagre. The yields obtained indicated that bone-meal was practically an ineffective manure in increasing the yields of berseem fodder, because phosphoric acid in bone-meal is mostly in an unavailable form on calcareous soils and is, therefore, not absorbed by the berseem roots.

The effect of superphosphate in which phosphoric acid is in an available form was enormous ; the average increase in yield due to application of 80 lb. phosphoric acid per acre was 68.2 per cent on a phosphate-deficient soil. Thus, superphosphate is far more an efficient source of phosphoric acid in stimulating the bacterial action of nitrogen-fixation in the berseem roots than bone-meal.

FERTILITY-BUILDING

The beneficial role of berseem in building up soil fertility was noticed in an experiment conducted during 1937 to 1939, on manuring of paddy under different rotations, viz., paddy-fallow, paddy-oats and paddy-berseem.

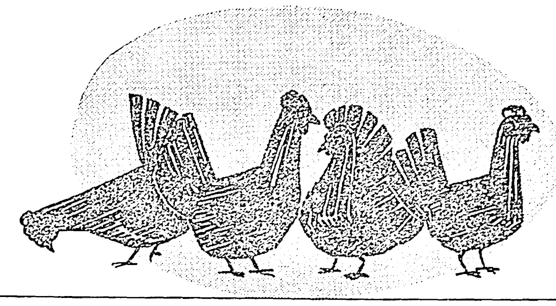
Increases of 52.75 and 40.09 per cent in the yield of paddy were obtained with the application of sulphate of ammonia at the rate of 40 lb. nitrogen in fallow-paddy and oat-paddy rotations, respectively. However, in the third year of the Experiment when berseem was introduced in the *rabi* season, the effects of sulphate of ammonia on subsequent paddy crop were completely masked due to improvements in soil fertility, and the application of extra nitrogen became superfluous.

The same trend of results was confirmed in another experiment for three years from 1947 to 1949 in which paddy dressed with sulphate of ammonia at the rate of 40 lb. nitrogen, recorded increases of 24.7 and 23.5 per cent in the cases of fallow-paddy and wheat-paddy rotations, respectively, but only slight increase of 5.6 per cent in a paddy-berseem rotation.

In two other experiments lasting for six and three years, respectively, an ample proof was obtained that it is futile to apply sulphate of ammonia to paddy in a paddy-berseem rotation. There was so much accumulation of available nitrogen in the soil for the requirements of paddy crop due to fixation of nitrogen by berseem root nodules, that it fully met the demand of the paddy crop equivalent to a dose of 40 lb. nitrogen per acre. When the extra dose of nitrogen was applied to paddy, the yields did not show any increase, rather they were proportionately a little less than the dosage of nitrogen applied.

For Poultry Farmers

ALL ABOUT THE EGG



by

S. G. Iyer

TALKING of eggs, the first thing you talk of is the size. Egg-size varies very considerably not only between different breeds but also between different individuals in the same breed. As a general rule, small birds lay small eggs and big birds big eggs.

The size of the egg laid by a hen depends on a number of factors. Inheritance has a lot to do with the size. The time of hatching is again another factor. As for example, early hatched birds take longer to reach a full egg-size. Climate is another. The size of the egg decreases during the very hot weather, while cold does not seem to have a similar influence. The rate of production also has an influence on the size of the egg. A very good layer takes a longer time to reach the maximum egg-size. It must be noted also that poorly-fed birds cannot give the maximum size of egg because they have to lay at the expense of the body size.

Eggs are small when birds are just coming into production, and increase in size for some months after they have come into it. The maximum egg-size is generally obtained during the pullet year in February or March and the size decreases from March to June and then increases again. When the monsoon breaks in India, the egg-size increases once again. The eggs laid by a bird in her second or third year tend to be bigger than the maximum size obtained in the first year

Since there is a tendency for the size to decrease even in flocks that possess a good egg-size, poultry-keepers must select for this quality continuously in their flocks. Females must be selected for egg-size and mated to males bred for large egg layers.

A hen which lays a long egg will continue to lay such an egg throughout her life. An abnormally long or broad egg does not attract. Such eggs also are liable to damage during transit. The breeder should, therefore, select for lines of normal shape.

The colour of the egg has no relationship with quality, but many customers prefer a dark brown egg. The colour is determined by the breed. A normal Leghorn, for example, lays a white egg while the Rhode Island a brown egg.

It is wrong to prefer birds that lay good coloured eggs from the economic point of view, because a good layer tends to lay a lighter egg than a poor layer. It is possible that the good layer lays a real coloured egg at the beginning, but after an intense lay, the colour may become lighter. It will be wrong to reject such eggs for hatching purposes.

Looking into the inside of an egg, recent research shows that all eggs are not of uniform quality. A first quality egg is one in which the yolk when broken out is upstanding and centrally situated and the white firm and does not spread unduly. It has also been seen that though the keeping quality is governed by atmospheric conditions, certain birds lay eggs which keep better than others.

The poultry-keeper should also be careful about birds which lay an unduly high proportion of eggs of inferior quality and having such defects as meat spots and blood spots. Such birds are likely to transmit this weakness to their progeny. It will be advisable to candle the eggs during the hatching season and set eggs only from birds which do not show any such defects.

The quality of the egg shell is also important. In marketing, weak shell eggs are more liable to be broken. The keeping quality of such eggs is also poor. The quality of the egg shell can materially be improved by a systematic selection for a good shell quality. Poultrymen, as a rule, should never set eggs which appear to have a poor egg shell texture as there is always a danger of the progeny inheriting the factor.

Poor feeding may result in poor egg quality. The egg shell is made entirely of chalk (calcium carbonate). As such it is necessary to feed the birds with sufficient quantity of calcium in a suitable form such as oyster shell or limestone grit. Birds cannot, however, utilise calcium without an ample supply of vitamin D. Excess to plenty of sunshine is one form of supplying vitamin D; shark liver oil is another good source.

Excessively fat birds or those receiving poor exercise also lay eggs with poor texture. As a general rule, birds from a dry climate produce better egg shells than those from a wet locality. Eggs produced in a wet climate, however, have a good keeping quality in the same locality, but do not keep as well if taken over to a drier climate as eggs produced in that climate.

INSECT-KILLERS IN FERTILIZERS

THE use of insecticides in combination with fertilizers is expected to expand remarkably among farmers of the United States.

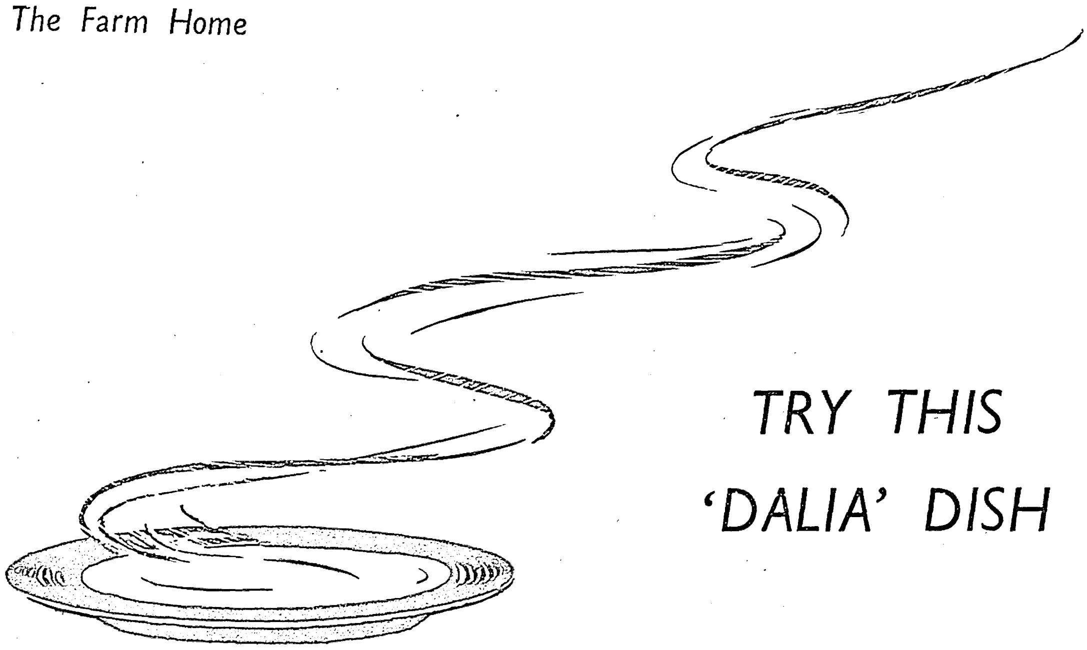
Tests conducted by scientists of the U.S. Government and of state agricultural stations during the last two years have achieved such successful results that a number of manufacturers are now ready to produce insecticide-fertilizer combinations on a large scale.

Last year the mixtures were found effective in controlling northern corn rootworms, wireworms, seed corn beetles, grubs and other soil insects that damage corn (maize). The combined fertilizer and insecticide was applied at the time the corn was planted. The corn thus treated was healthier and more productive than untreated corn.

In the north-central state of Ohio, extensive tests also showed that clover root borers can be controlled by applying a mixture of insecticide and fertilizer at the time red clover is seeded. Hay from the treated fields was considerably better than average, with second cuttings earlier and larger. The clover was expected to hold over to a second cutting year, whereas re-seeding had been necessary before.

Twenty companies are already prepared to furnish farmers in the north-central United States with insecticide-treated fertilizer fitted to particular area needs. The result is expected to be increased corn and hay production with probable benefit to other crops as well.

Aldrin apparently will be the only insecticide formulated with fertilizer for corn this year. The insecticide can be sprayed on the crop fields, as well as applied with the fertilizer. However, farm leaders expect the mixture to be more popular because it makes both applications possible in one process.



TRY THIS 'DALIA' DISH

by
RAMPA PAL

RECENTLY, I prepared a dish of *dalia* of a somewhat solid consistency and cooked vegetables, *dal* and a *chutney* in the South Indian style. The preparation was cream-coloured and softish, looked like *pilau* and tasted delicious. It gave better satisfaction to me than eating cooked rice.

Dalia is prepared by cleaning wheat of its grit and stones and rough-crushing it into small bits. It is used in North India as an invalid diet and for those suffering from teeth trouble. When cooked, *dalia* makes a fairly good meal.

I am mentioning this because many housewives in several parts of India, and especially in the South, found it difficult to take to wheat and *atta* during the time when the rice was rationed and available in small quantities. Some of them, because of the drastic change of diet and ignorance regarding the mode of preparing wheat dishes beyond *upma* or *murku*, suffered a lot because of the badly prepared wheat diet.

Why they did not like wheat preparations was mainly due to lack of elementary knowledge of the right technique of preparing *chapaties*, *purees* and *parathas*. Inexperience in kneading and baking methods results in a hard, lumpy and indigestible stuff which invariably causes stomach upsets, diarrhoea and dysentery.

I think *dalia* may be substituted with advantage in the place of rice and rice gruel. It will prove a popular and pleasant change of diet, especially, for rice-eaters. *Dalia* is nourishing too.

Here is how you prepare *dalia* for your meal:

> Take one cup of *dalia*, three cups of boiling water.

First take the *dalia* and roast it lightly till it gives a sweet aroma—the same way as you treat *suji* before preparing *upma*. Now place it in a *degchi* or wide-mouthed pan and pour the water on to it. Cook it for half an hour on a medium fire, but keep stirring constantly till it thickens or is of the required consistency.

This *dalia* should be a little coarser than the one used for making breakfast porridge.

Will housewives give *dalia* a trial ?

READERS WRITE

MAY COVER

Your front page cover for May was a pleasant surprise to me. I like it. —S.S.

COVER PICTURE FOR JULY

On the July 1954 cover are seen two Village Level Workers with a farmer. The picture is very impressive. But could you indicate which part of the country this picture was taken? —R.K.S.

The cover page picture was taken at Sindewahi (Madhya Bharat). The two Village Level Workers seen in the picture are trainees from the Training-cum-Development Project, Sindewahi, talking to a local farmer.

SEED TREATMENT

I was interested about the seed treatment given by the 'Man of the Month' (May 1954) for his jowar. *Please let me know how this treatment is given, because grain smut is commonly seen in our area.* —V.N.K.

In grain smut, the disease germs stick on to the surface of the seed and hence treating seeds with sulphur before sowing gives good results. However, the sulphur used should be of good quality and very finely ground (to pass through sieve with 300 meshes per square inch). The dose followed is three chhataks of sulphur for one maund of seed. If good quality sulphur is not available, Agrosan GN can be used. Agrosan is very effective and the dose is two chhataks per maund of seed. As the seed-treating chemicals are likely to corrode ordinary metallic vessels, some earthenware utensil like an ordinary pitcher can be used for mixing the chemical with the seed. Seed should be thoroughly mixed by shaking it well, taking care, however, to see that the person treating the seed does not inhale the fumes or dust.

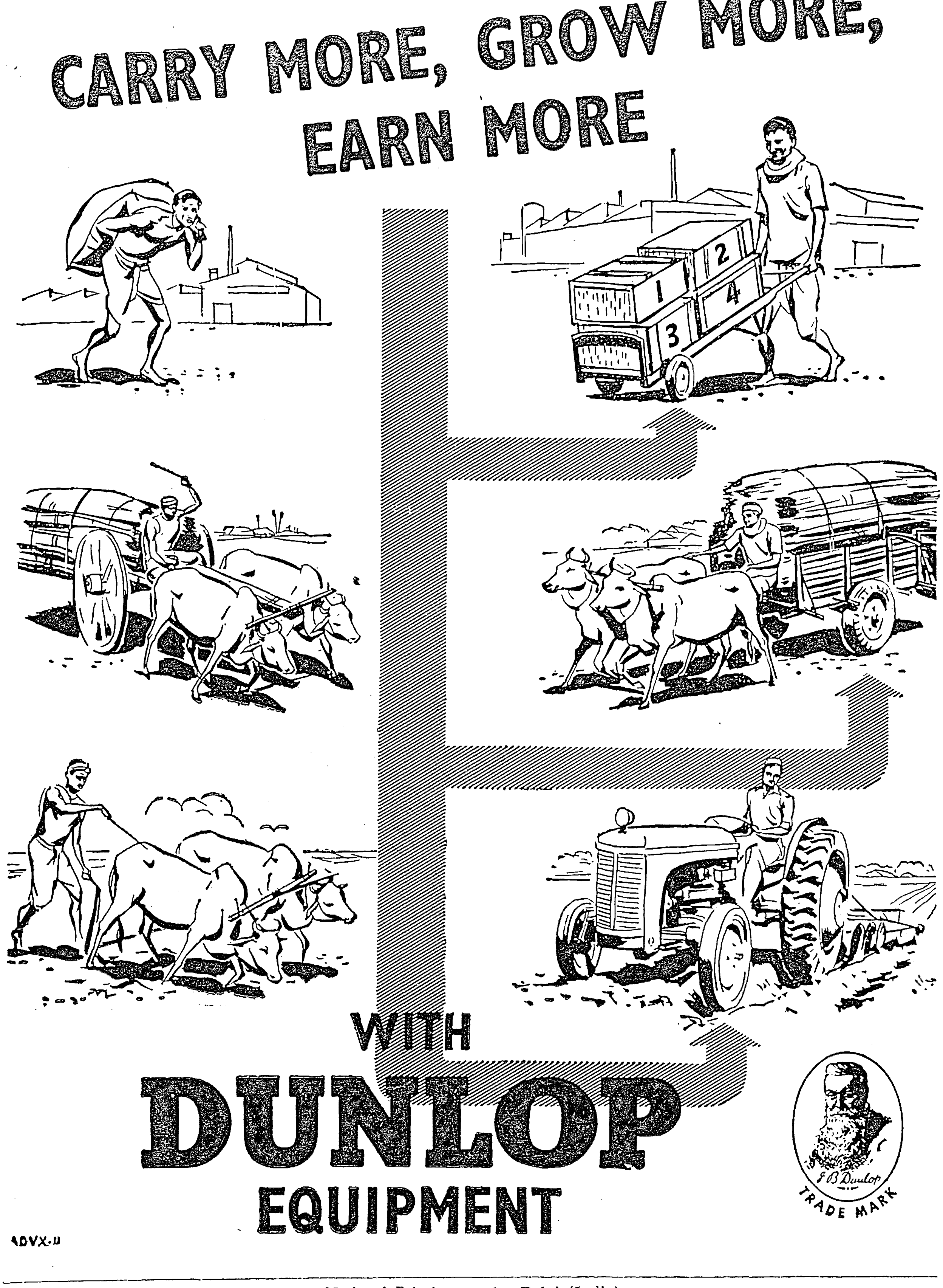
If a large quantity of seed is to be treated, it is better to use a seed-treating drum which is available in the market these days at a cost of about Rs. 60. Such a drum can treat one maund of seed at a time or about 40 maunds of seed in a day.

MIXED CROPS

P.C. Raheja's article "Mixed Cover Crops for the Monsoon" reproduced in your May 1954 issue, says that in northern India arhar *is the principal companion crop to* jowar, *yielding an average of about 12 maunds per acre. I would like to know whether this average yield of 12 maunds is from an acre of gross area under the mixture or is the adjusted yield per acre of the net area under* arhar. Arhar *occupies a minor proportion of the total area under the* jowar-arhar *mixture, and if the above figure refers to the gross acre, the yield per net acre will be quite high.* —R.G.

The *arhar* crop is grown singly or mixed with other crops, one of them being *jowar*. Mixed with *jowar*, it is grown in Madras, Bombay, Madhya Pradesh, Uttar Pradesh, Bihar, Bengal, Madhya Bharat, Hyderabad and Mysore. Mixed with *jowar*, it has the proportion of 1 : 2 and 3 : 10. Some cultivators grow it in rows, one row of *arhar* after two rows of *jowar*. Normally, both the crops occupy medium to heavy lands. Quite often, *jowar* is taken off as fodder and *arhar* as a grain crop. It is under these conditions that *arhar*, the principal companion crop to *jowar*, gives yields of the order of 12 maunds per acre. Such a high yield is obtained mostly on deep soils which contain less of clay and more of silt. I am informed that at the Anand Agricultural College in Gujarat they get a yield of 12 maunds when *arhar* is sown along with *jowar* in the same field in rows four feet apart. The yield of 12 maunds can be taken as net yield per acre of the mixed crop under good soil and rainfall conditions. The adjusted yield would be in the neighbourhood of 20 maunds gross yield per acre.—P.C.R.

THE EDITOR INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING," INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI



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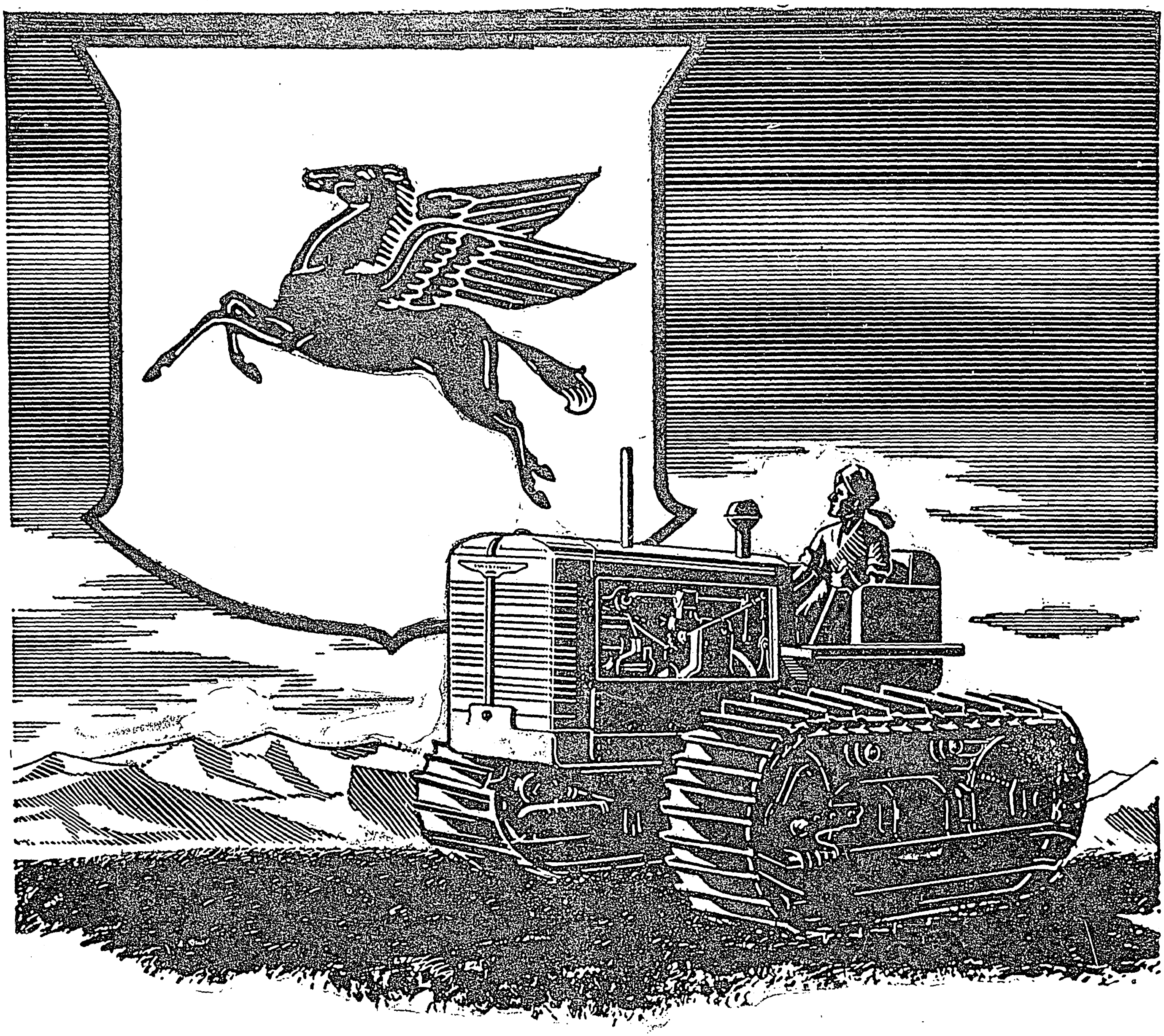

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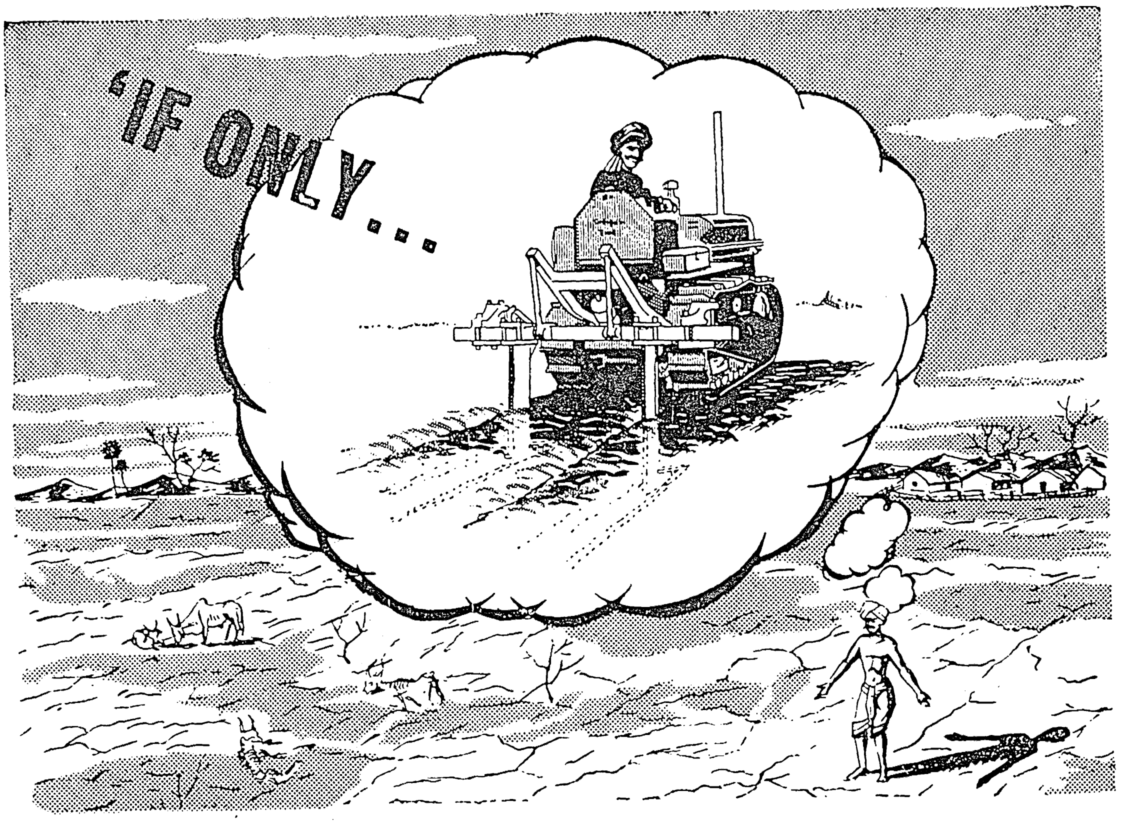
NOVEMBER, 1954



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Indian Farming

VOL. IV NOVEMBER 1954 No. 8

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ISSUED BY
THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

WHAT THEY NEED IS CONFIDENCE

AN Extension worker was relating an interesting experience the other day. He had introduced a new type of *ragi* (*nachni*) in a rather out of the way village. The variety stood even the adverse conditions well in the field of the farmer to whom the seed was given for trial. Since this field was near the one road of the village, every farmer there had seen the crop and admired it. When the crop was ripe, the Extension worker held a rally of the farmers of the village and the crop was threshed and the grain measured in their presence. The yield was almost double that of the local variety. There was no doubt that every one present was impressed by the performance of the new variety grown. The Extension worker took the opportunity to explain to the farmers the important characteristics of the new variety and offered to supply the seed of the same to them which he had in stock with him for trying on their own fields. To his surprise, none wanted the seed from him, but they all said that they would obtain the seed from the very farmer who had ventured to try it and in whose field they had seen it grow and yield heavily.

The story has a moral. It is not that the farmers in this case did not know that the seed that the Extension worker had was the same as that was grown on the field of the farmer of the village. But it was a matter of 'seeing is believing' with them. Once one of them had grown the new variety and found it successful, the rest had the confidence in it and thereafter would even stake anything for it. What is true of this village is true of thousands of other villages. The lesson that the Extension worker learnt that day was valuable. It was that villagers had the greatest confidence in their own leader who would not do anything, they believe, that would go against their interest.

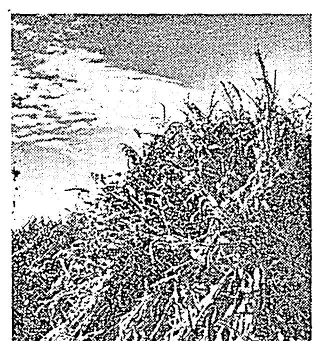
Whenever a new improvement is suggested in any village, villagers hesitate to adopt it unless one among them in whom they have confidence tries it and finds it successful. It is but natural that one cannot expect villagers, whose land returns are not large enough, to risk a new improvement. The improvement has to be tested by a person who can afford to bear the losses in case the experiment turns out to be a failure.

In other words, there must be some assurance for the lay farmer that the new thing that he is introducing in his farm will not end up in material loss to him.

Such a trend of villagers' reactions seems to have been taken into full consideration by the Bombay Department of Agriculture when it established what are called agricultural demonstration centres on the cultivators' own farms in each taluka. The Department introduces all improvements in those farms with a guarantee that if as a result of the introduction of these improvements there were to be any losses, the Government would make up such losses. This has given the required confidence to the farmers to take up these improvements without any reservation, and though the Scheme has been working for the last 10 years or more, it is reported that there has not been even one occasion for the Government to pay compensation to any of the farmers owning these demonstration centres.

It is when such a confidence is created in the farmers, that they and their neighbours see the futility of sticking on to the traditional methods and will voluntarily come forward for more and better improvements.

OUR COVER



How does this harvested maize compare with yours? Farmers all over the country are coming to realize that the secret of successful farming lies in proper cultivation, good manuring and use of good, improved seed. Ask your Extension Officer what seed he can recommend you—so that you too can raise as good a crop as this one

HARD WORK BUILDS A FARM

'SUCCESS comes with hard work' is the motto which has made Shri Sadanand N. Wandrekar, a successful farmer, these 30 years or more. Years ago, he told me, he was interested in sugarcane; not raising just sugarcane, but raising the best sugarcane. In those days, when sugarcane research was still in its infancy, and no manurial or cultural schedules were available as they are today, he raised 103 tons per acre with POJ 2878. That was in 1935. His interest next shifted to coconut. Coconut was considered not fit for growing on a plantation scale in the Thana area of Bombay, but when Wandrekar wanted it he was bent upon growing it. He grew not just one plant, but ten acres of it and successfully too, which made many a sceptic raise his eyebrows. All his labours, however, were lost in a violent cyclone some years later.

Then his interest shifted to building up a farm from waste land. Friends warned him that he will be sinking his money, but hard work saw to it that the waste land bloomed into a first rate fruit-cum-general farm. *Mosambies* and mangoes reign supreme in the 40-acre orchard that Wandrekar has raised on what was thorn and weed.

"Next to hard work," said Mr. Wandrekar, "I would recommend to farmers quality plants, good cultivation, good manuring and plant protection." Explaining what good cultivation meant, he said: two ploughings, one working with a cultivator and a number of weedings and

(*Contd. on page 6*)

Two of the farmer's buffalo-calves born out of artificial insemination

Top : Sardar Gur Inder Singh, the farmer who showed that a big farmer can also be a progressive farmer
Bottom : Manager Ram Lal in the paddy crop raised by the Japanese method

A STRAIGHT HOP from 30 Maunds to 80

by
MALCOLM ORCHARD

IT must be admitted that it is easier to be a progressive farmer if you are a big farmer. At least, a big farmer doesn't have to live up all his returns. He can accumulate something for investment in better equipment and methods. But many of the bigger farmers are failing to invest in better ways and, in turn, to serve as examples for their neighbours. Too many able men are continuing to influence people to use poor ways by using the same old ways themselves.

The other day we found a refreshing exception to this in Karnal district. We were visiting Mr. Subba Rao of the Karnal Sugarcane Research Station who promised to take us to this exceptional and influential farmer.

We got into the jeep and drove north to Shamghar about four miles away from Karnal city. When we entered the village which sits on a modest hill about two furlongs from the road, Mr. Subba Rao asked for 'Sardarji'. It seemed rather odd that in a Punjab village one could find anybody by asking for him by that general title, but we were immediately given the

proper directions. We soon found ourselves entering the gateway of an old fortress built from the small brick of the Moghul period. Inside we were greeted by Shri Ram Lal Khurana who, we learned later, is the farm manager. Over in one corner of the huge compound we saw a large man directing the construction of a brick building. This we were told was 'Sardarji', or more properly, Sardar Gur Inder Singh.

Shri Ram Lal called him over and we all sat on the large cool verandah overlooking the compound area and facing the front wall of the old fort. Sardarji ordered cold lime squashes and we started asking questions about his farming. He made it clear to us that while he maintained a close watch on all farming operations, he trusted the details to his good farm manager, Ram Lal Khurana, who is a college graduate in agriculture and has many years of successful experience in practical farming. Ram would give us all the details, the Sardar said.

FIRST TO TRY NEW IDEAS

This takes us back to our first point: a big farmer should be an example for small farmers. He should try new things first. He should run the risks of new ideas, because he can better afford to lose a little from a small area.

This is what the Sardarji does. He demonstrates the value of new ideas. Sometimes ideas are not good and he loses a little. Sometimes they are good and everybody who is progressive enough to follow profits by the demonstration.

Last year, when Extension workers came to him about trying the Japanese Method of paddy-growing, he called his farm manager and they decided to try the method on three acres. On these three acres they would follow all the recommendations publicized by I.C.A.R.'s Campaign Committee. So they told the Extension workers that the paddy would be planted and they could bring neighbouring farmers so they could see how it was done in detail. Ram Lal had the land ploughed 12 times. He applied 15 cartloads of manure to each acre. For the nursery, he used eight seers of seed instead of his usual 12. He also applied one pound of manure mixture (ammonium sulphate and superphosphate) to each 100 square feet of the nursery bed. Again, after 15 days he applied to the

Here are two cane crops worth looking at. The one on the right was grown where paddy by the Japanese method was raised last year, and the one on the left was grown on the best field on the farm. Obviously, the residual effect of the fertilizers applied to rice made the canes more robust on the right

nursery another one-half pound of ammonium sulphate to each 100 square feet of bed. He planted *Jhona 349* seed.

Then he waited and watched. At first there didn't seem to be much difference in the nursery beds. Then about the time he gave the first weeding he could see quite some difference. The last week the seedlings seemed to jump out of the ground. The seedlings were large at 28 days-old when he pulled them for transplanting. Ordinarily, it took him 40 days to get seedlings ready.

Thus the first part of the new method was showing up very well. But what would finally happen ? This land was accustomed to producing 30 maunds per acre. Could he push his production much higher than that and make money ?

He was going to try. So to the field he applied a mixture of five maunds of ammonium sulphate and five maunds of superphosphate in two doses. The first dose came before planting. The second, three weeks after planting. Weeding was done three weeks after planting and again a month after planting.

Again it was watch and wait. But there was very little time for questioning the outcome. The better start the early seedlings—the bigger seedlings—had made a difference from the very beginning. The only question left was: just how much more is this improved method going to yield.

The results were more than good. Eighty-four maunds compared to the usual 30. This was 80 maunds of dry paddy. And the turn-out of rice was 77 per cent compared to the usual 65.

In order that there be no question about these yields the agricultural officers and Extension teachers were invited out to the fields to witness the outcome. But even before this, these Government workers were conducting tours for villagers out to see the amazing demonstration of increased production. An increase brought about by very simple, yet scientifically proven methods that any farmer can adopt.

We were told all of this sitting on the verandah sipping lime squash. But as the farm manager pointed out, this is no way to know a farming operation, and all arm-chair farmers should see the real thing. We took his suggestion.

After going about four miles in muddy roads we came to his paddy fields. This year, he told us, he had placed 15 acres of paddy under the Japanese system. He had a total of 80 acres in paddy. We saw the fields and there was a great difference in growth. The ordinary fields were about knee-high. The better fields were chest-high. And both were planted July 15.

Why didn't he plant all his land under the improved method ? In answer to that he said that some of the land was low-lying and difficult to handle. It might be a risk to apply so much fertilizer to this kind of land. On his other paddy acreages he is following a modified version of the Japanese method. This includes line-sowing, but not quite so accurate, and fertilizers, but not quite so much. Later, he said, he might plant all his land the improved way.

INTERESTING EXPERIENCE

As we were returning from the paddy fields he took us by his sugarcane. There were two fields side by side, but there was a difference of about three feet in their heights. Why this difference, we asked ? "That", he said, "is an interesting story. All the cane was planted the same day; the ploughing, the fertilizer, the seed were all the same. The only difference: the taller field is planted on the three acres where I had my demonstration of the Japanese method last year."

"What does this mean ?" "This is simple," he answered. "When you get higher yields you improve your land. In fact, you can't do one job and not do the other. They go hand in hand. Fertilizer placed on this land for increasing the yields of paddy has at the same time improved the land for the following crop. It is plain for anybody to see that a much higher yield will come from the cane that followed the fertilized paddy."

Thus, while Ram Lal, the farm manager, demonstrates better ways for farming for Sardar Gur Inder Singh, he improves the Sardar's land, and by the time these demonstrations have covered all his land, the Sardarji will be getting double his yields, and, it is hoped, his neighbours will be following his example. If they are following his example in a high enough number, the food problem in India will cease to exist.

(*Continued from page 3*)

hand-hoeings. Manures used for *mosmabies* and mangoes were: farmyard manure five baskets, bone-meal two pounds, groundnut cake and castor cake five pounds.

The farmer believes in mixed farming. He maintains a small dairy of 20 buffaloes. He was the very first one in the District to try artificial insemination for his cattle. "It gets me excellent calves and no bother of maintaining a bull," he said.

None can miss seeing the hard work Wandrekar has put in in his 'Wandrekar Bagh' near Poona City.

M.G.K.

weed your rice with these weeders

The three single row rice weeders with row-widths (from left to right) of four inches in the first two, six inches in the second two and seven and a half inches in the last two

by
R. V. RAMIAH

FARMERS have been showing plenty of interest in the new Japanese type rice land weeders ever since they were first tried in Pusa, Bihar (*Indian Farming*, October 1952).

State Governments in Uttar Pradesh, the Punjab, West Bengal and Bihar, the Central Rice Research Institute, Cuttack and the Jute Research Institute, Calcutta, have also been trying the working models of single row weeders supplied by the Indian Agricultural Research Institute, New Delhi, to study their suitability to the various areas.

The Central Rice Research Institute, Cuttack, which planned out scientific experiments to see whether this kind of weeders had any advantage over the present method of weeding rice lands had this to say:

'Interculturing with the rotary hoe is beneficial to the crop and increases yield. Last year, the crop weeded by the local method gave a yield of 3,016 lb. per acre while that intercultured three times with the weeder gave 3,129 lb.

'However, if the weeder has to be successfully worked, it needs to be modified to suit our conditions. Both single and double weeders get stuck in the mud and it is difficult to work smoothly without a forward pull.

'It is seen that the turn-out is about half an acre per day of eight hours and two people are needed to work it. It is desirable that it is so adjusted as to allow only one man to work it. The implement is quite light and there should be no difficulty for one single person to operate it as they do in Japan, but we find the implement nooses down and gets stuck in the mud. Possibly, an adjustment in the handle of the angle will prevent the implement from noosing down. The cost of the implement should also preferably be less than the present cost of Rs. 20 each.'

The Indian Agricultural Research Institute has so far sold out working drawings of the single row weeders to nine firms in India and to two State Governments and one to the Agricultural Officer

(*Continued on page 30*)

Growing crops grow better when phosphatic fertilizers are first treated and then applied

'COMPOST' your phosphatic fertilizers

by
C. N. ACHARYA

NOT many of our farmers use phosphatic fertilizers to the same extent as they do nitrogenous fertilizers.

One reason for this is the smaller response crops show to phosphates as compared with nitrogen. This is partly because plants absorb phosphates in lesser quantities than they absorb nitrogen. Again, because most soils lack in organic matter and nitrogen, greater stress is laid on nitrogen as a limiting factor in crop production.

But there are areas, like the red soil regions as in eastern Madhya Pradesh or south Bihar and the lateritic zones as on the West Coast, where the quantity of available phosphorus in the soil is much too small to meet the demands of crops. In such soils a combination of nitrogenous and phosphatic fertilizers gives a much higher yield than when nitrogen is applied alone.

The quantity of available phosphorus in most soils is sufficient to meet the needs of a small-sized crop, yielding, say, 1,200 lb. of paddy or 800 lb. of wheat or 20 tons of cane per acre, but when a higher level of production is desired, the supply of available phosphates becomes much too small and it is necessary to give an extra quantity in the form of fertilizers.

When phosphates are added to the soil they easily get converted into insoluble and unavailable forms because of the action of soil minerals, and as such the full effect of the fertilizer added is not felt. Nitrogenous fertilizers, on the other hand, remain in a soluble form in the soil and are available to crops to an extent of 50 to 80 per cent. In the case of phosphatic fertilizers, the crop is usually able to utilize about 10 to 12 per cent only of the quantity added, the rest being converted into a form not readily available to the plants. This difficulty is more serious in certain types of soils.

There are many types of phosphatic fertilizers available in the market, the more important of them being raw bone-meal (unsteamed), steamed bone-meal, rock phosphate, single superphosphate, ammoniated superphosphate, ammonium phosphate, triple superphosphate, basic slag, bird guano, meat-meal and fish-meal.

The most naturally occurring phosphatic fertilizers such as rock phosphate, bone deposits and guano have but a slow effect on plant growth because of the insoluble form of phosphates they contain. Though attempts are made to make the phosphates contained in such fertilizers more soluble by treatment with acid and conversion into superphosphates, the phosphates revert to the insoluble form in the soil.

PLACEMENT OF FERTILIZER

Attempts are being made to get over this difficulty by recommending the 'placement' method of application wherein the phosphatic fertilizer such as the superphosphate is applied in lines and at suitable depths so as to be near the root zone of the growing crop. This method, no doubt, helps increase the quantity of phosphate absorbed by the crop, but it is applicable mainly for line-sown crops, and especially so where the lines are wide-spaced as in cotton or corn. It becomes less useful for broadcasted crops like small grains or the fodders and transplanted crops like rice.

The 'placement' method also causes an excessive concentration of the one nutrient, the phosphate, in the root zone of the plant, which is detrimental to the absorption of other essential plant foods in the soil.

Experiments at the Indian Agricultural Research Institute, New Delhi, show that the process of reversion or fixation of superphosphate in the soil, can, to a certain extent, be reduced by mixing the superphosphate with 20 to 50 times its weight of compost or farmyard manure before applying it to the field. This way, the absorption of phosphate and crop growth have been noticed to increase a great deal.

Best results, however, are obtained by composting the superphosphate with actively fermenting organic refuse.

THE COMPOSTING METHOD

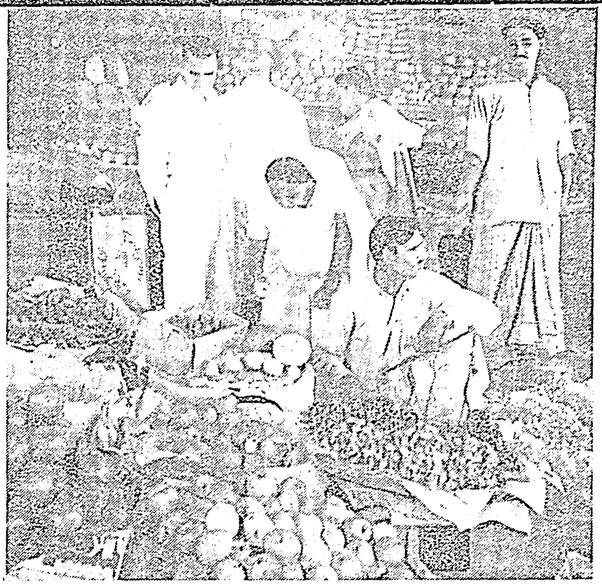
This is done by spreading the superphosphate powder in thin layers, say, $\frac{1}{4}$th-inch thick, over alternate layers of, say, six inches, of mixed cattle-shed refuse or other compost material. The heap or trench so filled up is allowed to ferment for four to six months after which the manure is well-mixed and applied to the field. The fermentation becomes quicker when the mixed refuse contains a sufficient amount of available nitrogen in the form of cattle urine or nitrogenous fertilizers.

Crop trials at the Institute show that when such composted superphosphate is applied to crops, the growing crop takes up a greater quantity of phosphorus and yields higher than when phosphate is applied with an equal quantity of cattle-shed compost, without fermenting the two together. Moreover, laboratory experiments show that the composted superphosphate is protected, to a great extent, from being fixed or converted into insoluble forms by soil minerals.

Composting also is helpful in increasing the solubility of insoluble phosphates such as rock phosphate and bone-meal. Before composting, however, these must be ground to a fine powder, to pass through, say, a 100-mesh sieve. The method of composting is the same as for superphosphate. It is found that after four to six months of fermentation, 50 to 70 per cent of the insoluble phosphate is converted into more soluble forms which could be absorbed by the plants. Experiments show that as with composted superphosphate, composting rock phosphate or bone-meal also gives a higher yield of crops when applied along with nitrogenous fertilizers.

The practice of composting superphosphate, rock phosphate or bone-meal before application as manure is worth adopting when phosphatic manures are to be applied either for making up phosphatic deficiency of the soil or for increasing crop-yields.

LET THE AGMARK SEAL BUY AND SELL FOR YOU



You do not know what you are bargaining for when there is no grading by Agmark

LET the Agmark seal buy and sell for you. For, then you will not be confronted with problems such as what to buy, where to buy and how much to pay, as usually happens when you come across produce of different size and quality in the market and graded by the seller according to his own conception.

When you buy Agmarked produce, you can be sure that it satisfies the various standards of quality laid down by the Directorate of Marketing and Inspection, Government of India.

Grading is helpful to the buyer as much as it is to the seller. While the former when going in for Agmarked produce has the satisfaction of getting what he has actually paid for, the latter is able to obtain a reasonable price for his produce, resulting in a better turnover for him.

The Directorate has laid down quality standards for various kinds of produce including fruits, rice, jaggery (*gur*), cotton, etc. These standards have been evolved on the basis of certain well-defined physical characteristics and differences in quality.

FRUITS

In fruits, the factors taken into consideration in fixing Agmark grades vary from fruit to fruit. For example, in mangoes, the factors considered are: weight, freshness and firmness, size and shape, colour and appearance, freedom from blemishes, damage and malformation and keeping quality; in *mosambies* and oranges: size (diameter), shape and form, stage of maturity, colour and its uniformity, freshness and firmness, nature of skin, freedom from defects due to disease and mechanical injury and keeping quality; in apples and pears: size (diameter) and shape typical to the variety, stage of maturity, colour and its extent of shade and uniformity, freshness, firmness, form and keeping quality, freedom from damage due to disease and mechanical injury; and in pineapples: weight, stage and state of ripening, colour, shape, form, firmness and condition of development, length of the crown and freedom from blemishes and defects due to disease and mechanical injury.

Fruits for which grade specifications have so far been laid down and which are actually being graded are: mangoes—*Alphonso* (Bombay) and *Bathua* (Bihar), *mosambies* and oranges (Bombay, Madhya Pradesh, Andhra and West Bengal), apples and pears (Kulu and Himachal Pradesh), *chikoos* (Bombay), pineapples (Travancore-Cochin) and vegetables—potatoes (Nilgiri Hills).

RICE

The principal factors that determine the commercial grades of rice are the test weight for a given number of grains, the flavour specific to the variety, damaged kernels, freedom from foreign matter and other grains or other classes of the same grain and, also, size of the grain. Freedom from musty and obnoxious odour is also taken into account.

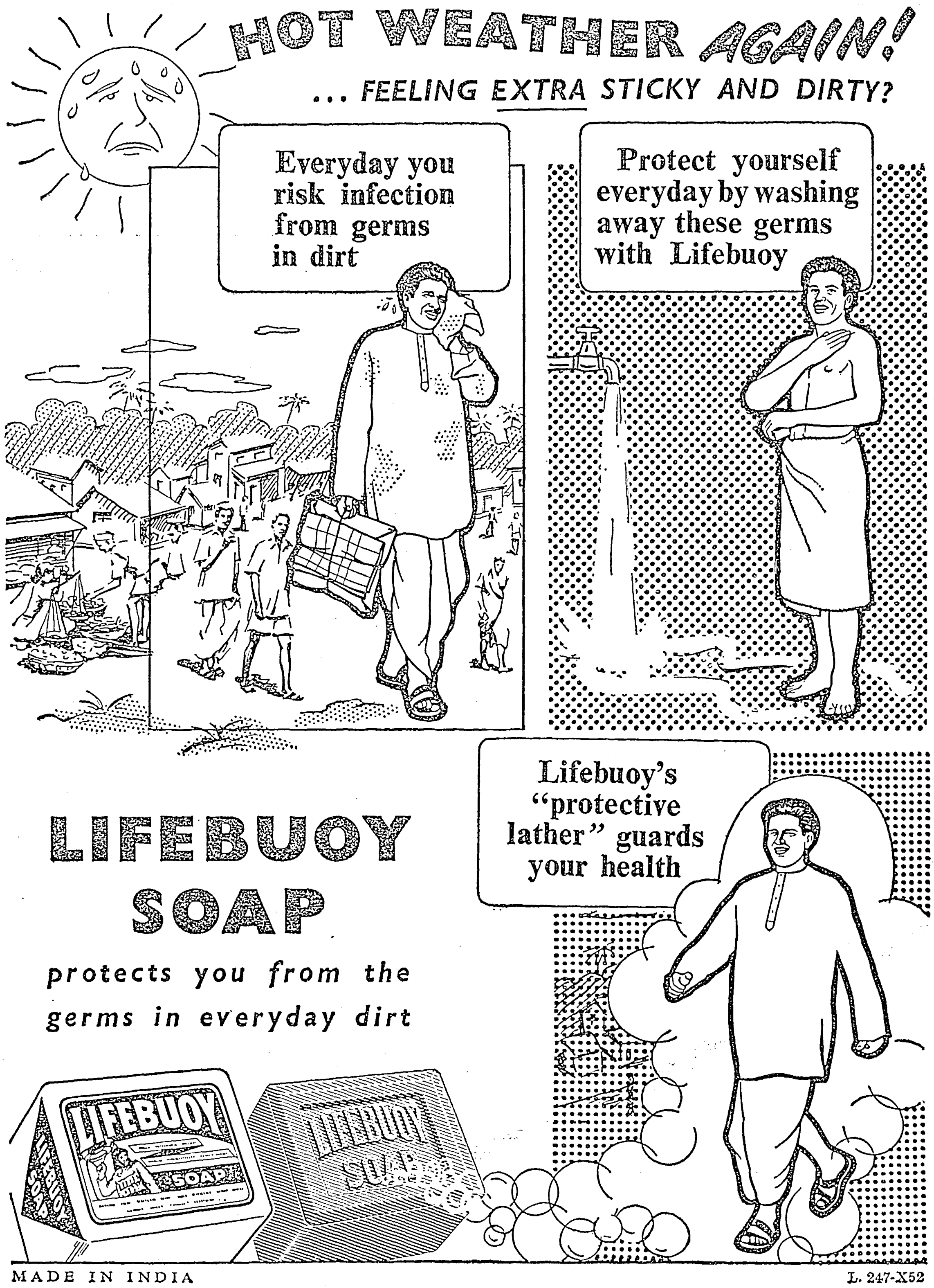
The sum total of the presence or absence of the quality factors indicated above goes to determine the grade of rice. The grade specifications for a number of varieties of rice grown in the country have been drawn up and large quantities were being graded under Agmark until control on rice movement came in as a result of World War II. Grading of rice has once again been revived since last year and at present is in progress in the States of Madras and Uttar Pradesh.

CANE JAGGERY (*GUR*)

The factors that go to assess the quality of *gur* are: colour, texture, form and consistency, refraction of bagasse, dirt and other impurities, moisture content, freedom from sour taste and mould, taste and flavour.

The grading of *gur* under Agmark standards is at present done in Bihar and Madras States.

(*Continued on page 30*)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PROCESSED COWDUNG AS POULTRY FEED

by

S. Bose

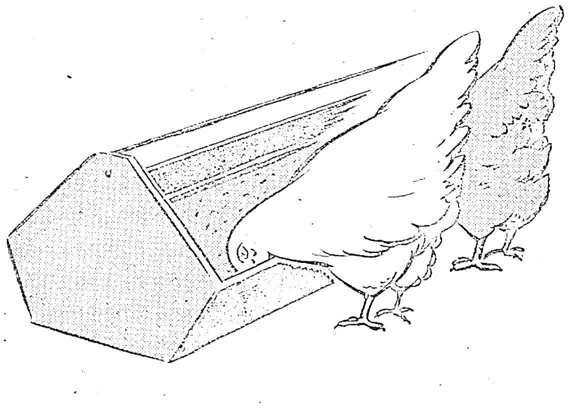
INTERESTING results have been achieved in the research carried out at the Indian Veterinary Research Institute, Izatnagar, on economic methods of feeding poultry.

One such result is the value of cowdung as a rich source of protein feed for poultry.

Poultry feed is the largest single expense in the production of poultry meat and eggs, and unless the cost is reduced, poultry-keeping will not give a substantial margin of profit to the owner.

So far as egg-production is concerned, experiments showed that plant protein supplements like soyabean meal and groundnut cake meal were of little value. Animal products like skim milk, fish meal and meat offal contain a better assortment of essential body-building substances (amino-acids) than plant products. But the poor results with plant protein supplements may not entirely be due to the quality of the proteins contained in them, but to the absence of enough amounts of minerals and vitamins in the diet. When plant proteins in the diet have been properly balanced with minerals and vitamins, good growth and egg-production have been obtained.

Because of the high cost of animal protein supplements, investigations were made whether plant proteins from waste materials like cowdung could be utilized for feeding poultry. Cowdung contains both male and female sex hormones, besides growth-promoting factors. The investigations were to see what effect these hormones and growth-promoting factors had on egg-production and hatchability.



SEX HORMONES

When a normal poultry ration got an addition of eight per cent air-dried cow manure, it stimulated growth and comb-development in both male and female chickens. Comb stimulation in table birds is desirable because of the better appearance it gives to the live birds at the time of sale. The feeding of air-dried cow manure, however, was unfavourable to laying birds. The inclusion of eight per cent air-dried cow manure to the laying ration given to hens reduced their egg-production by 10 per cent. Even when the cow manure was dried at 80°C for 24 hours and given in a groundnut cake supplement and at eight per cent level in the laying ration, the egg-production was nine per cent less than those fed with the ration containing groundnut supplement only.

This effect was due to the male sex hormones contained in the dung the potency of which obviously could not be destroyed even by heat treatment. This was confirmed when the heat-treated cowdung was fed to growing chickens at the eight per cent level. The chickens showed better stimulation in comb-development than those which got the control ration.

WATER EXTRACTION

Further investigations proceeded and it was found that the growth-promoting factors in the cowdung could be removed by extracting it with water, leaving a residue which when added to a laying ration gave a significant increase in egg-production.

The processing of the cowdung is carried out by stirring the air-dried manure with 10 times its weight of water for half an hour, filtering it through a linen cloth and finally washing the residue with water.

An extensive experiment was carried out to study in detail the effect of including the water-extracted residue and the water extract separately in the ration for growing chickens. The feeding experiment was continued throughout the laying period.

It was seen that the inclusion of filter (the water extract) from the cow manure increased the rate of growth of chickens by about 20 per cent in eight weeks and 15 per cent in 20 weeks as compared with the ration containing the water-extracted residue. The feeding of the water extract showed considerable stimulation in the development of the combs and wattles of the chickens.

The laying trial experiment showed that birds when fed with a mash containing the water-extracted residue of the cow manure at an eight per cent level increased production of eggs as compared with the ration containing the water extract from the manure. The average percentage of egg-production in the groups fed with the residue and extract from cow manure was 47 8 and 41·3, respectively.

(*Continued on page 30*)

Jowar too Responds to Japanese Method

Like rice, *jowar* too responds to intensive cultivation, as this experiment showed

by

S.K. MISRA

THE *jowar* crop responds well to manurial and cultural treatments, but how well does it respond if the treatments are on the same level as prescribed for paddy under the Japanese system? This was the subject of an interesting experiment conducted in the Nagpur Farm in Madhya Pradesh during 1953-54.

With the intensive manurial and cultural methods followed in the experiment, it was seen that *jowar* could be made to yield three to four times the normal, even under rain-fed conditions. To Madhya Pradesh, like Bombay, Hyderabad and Madras, *jowar* is an important staple crop. In the State, annually about 48 lakh acres are put under the crop, which, on an average, yields 652 lb. of grain per acre.

As under the Japanese system for paddy, the factors paid attention to in the raising of the *jowar* crop for the experiment were the selection of a high-yielding variety for sowing, application of heavy doses of fertilizer mixture, sowing of seed with proper and uniform spacing and cultural operations at the right time.

Under the black cotton soil conditions of Madhya Pradesh, *jowar* requires an adequate quantity of nitrogen for proper growth, and phosphoric acid for the formation of a strong root system and formation of ear and grain. The root system requires to be strong in view of the tendency to lodge under conditions generally prevalent in November.

However, when these two are applied at sowing time or as topdressing, it is seen that they adversely affect the germination of seed and also encourage excessive vegetative growth without any appreciable effect on the formation of grain. Hence, a new method of fertilizer application was tried at the Nagpur Farm to get over these ill effects. The method was such as to avoid harmful effects of fertilizers which generally happens when heavy doses of fertilizers are applied to rain-fed *jowar*, and rainfall is unfavourable.

THE METHOD

The land on which the experiment was tried,a medium black type soil, was under wheat the previous season. It was *bakhared* about four inches deep in the summer, and followed by two crosswise *bakharings*.

The soil received both organic and inorganic manures. At the end of May, eight tons of compost were applied to the land and mixed well by *bakharing*. After the monsoon commenced, the land was again *bakhared* to destory all weeds, and 60 lb. of nitrogen and 60 lb. of phosphoric acid were applied as a mixture, in two doses. The two were applied in the form of ammonium sulphate (160 lb.), groundnut cake (350 lb.) and superphosphate (350 lb.),

Half the dose of the mixture was applied deep in the soil towards the end of June in lines through *saratas* attached behind the *argada* having lines 18 inches apart. A week after, the land was *bakhared* but without disturbing the base line.

The new method made the plants look like this

Three weeks after the first dose of fertilizers was applied, the second dose was similarly applied.

The variety selected for sowing was *Saoner*, a high-yielder. The seed was graded and only bold grains selected for sowing. It was treated with Agrosan G.N. The sowing was done in the last week of July by an *argada* in the same lines in which the fertilizer mixture was given.

After sowing, the soil was pressed and the seed covered by working a *pathal* (an inverted long *bakhar*). The seed-rate used was 10 lb. to the acre.

When the crop was about a foot in height, it was thinned out, keeping the plants 9 to 15 inches apart. Four hoeings were given by *guntaka* hoes at 12-day intervals. These hoeings not only helped loosen the soil, but also because of the soil being thrown up against the base of the crop, helped support the young plants. The crop was weeded thrice.

Three weeks before the ears emerged, the crop was earthed up. This operation not only gives a good support to the crop and prevents it from lodging, but also prevents the soil from cracking, thus preserving moisture for a longer time, and checks an excessive vegetative growth of the crop.

Removing the leaves of the plants for a foot or two above the ground, depending upon the height of the plants, is beneficial in many ways. With this treatment given to the crop, it was seen that right from the beginning a vigorous growth was seen in the plants, so that in 60 days the crop reached seven feet in height. The earthing up and removal of lower leaves done after the fourth fortnight helped in reducing the rate of vegetative growth.

Ears begin to emerge in 90 days of sowing and continue up to the 105th day. To prevent lodging of the crop which reduces grain yield, in addition to the earthing up already done, six to eight plants were tied together with leaves to give them additional support.

During September, the crop requires moisture in the soil, and hence requires to be irrigated if rains fail. The rainfall during the month, however, was sufficient this year for the crop, and hence irrigations were not found necessary. However, to test the efficacy of irrigation at this stage, half the area under the crop was irrigated. But it was found that this had no extra benefit, as there was no appreciable increase in the yield in the irrigated crop.

MORE PROFITS

The crop was harvested after about five months of sowing. The yield was 72 md. 32 sr. (5,968 lb.) of *jowar* per acre in the unirrigated area and 76 md. 28 sr. (6,288 lb.) in the unirrigated area. This yield was about ten times the normal yield of *jowar* in Madhya Pradesh. Comparing the cost of cultivation of the new method followed by farmers, it is found that under the new method the total cost came to Rs. 321-11 (unirrigated) and Rs. 349-3 per acre (irrigated) as against Rs. 116-9 by the ordinary method. The gross return worked out to Rs. 1,128 and 1,167 for the unirrigated and irrigated crops respectively, as against Rs.320 by the usual method. The net profit per acre, therefore, worked out to Rs. 806-5 (unirrigated) and Rs. 817-13 as against Rs. 203-7 by the ordinary method.

The Experiment, therefore, indicated that the new method as tried on the farm had great potentialities for increasing *jawar* grain and fodder yields and bringing better profits to the farmers.

The plants were tied this way to prevent them from lodging

Let's Talk Soil Conservation

by

S. P. Teotia

ONE difficulty that faces Extension workers in educating farmers in soil conservation measures is the small size of the average farm unit and fragmented holdings.

To this, the only answer would be getting the farmers to form associations and taking up soil conservation measures on a co-operative basis through them.

This would be necessary for another reason too. A piece of land requiring a particular measure may belong to different farmers in the same village or farmers hailing from different villages. It will be easier to persuade farmers to take to these measures if they could be collectively made to take interest in the work.

Soil conservation is not a mere control over erosion. It includes all those measures and practices which help maintain the productivity of the soil at a high level through scientific methods designed to conserve soil and water. In other words, soil conservation is improved land use.

Publicity and demonstrations which make farmers aware of the magnitude of erosion problem and control measures should go side by side with the conservation programme. Extension teaching can be through the personal service group which includes field visits and Extension schools, the propaganda group which includes bulletins, leaflets, radio broadcasts and general meetings and the object lesson group which includes demonstrations, exhibits and film shows.

By far the best among these would be demonstration. For this, however, the Extension man should first create confidence in farmers so that they may never feel suspicious of what is being put up for them to see.

Better land use can be planned by aiming at a scientific conservation farming which includes both soil and water. The conservation problem has to be tackled both on cultivated and waste land. The work on the former is easier. A general programme for conservation Extension will be consolidation of holdings, introduction of improved methods of farming which safeguard the fertility of the soil and demonstration of such operations as construction of ponds and tanks for irrigation, drainage of irrigated land, contour cultivation, graded channel terraces for the uplands, discouraging the up and down cultivation on slopes, improvement of the uplands by green manuring and applying of fertilizers, better fertilization and irrigation of paddy lands, water management and conservation of gullies.

A SOCIAL PROBLEM

Conservation work on waste lands is more of a social problem than a technical one. Since these lands belong to a community as a whole, these are the worst eroded areas and need protection the most. Such areas make a forest problem. In the Damodar Valley area the waste lands have been sub-divided as follows:

(i) Gullies: some of these are non-reclaimable and are to be tackled as gully area and be protected by gully plugging, check dams, etc. Some of these are reclaimable for paddy cultivation and some for afforestation

(ii) Waste lands reclaimable for paddy cultivation

(iii) Waste lands reclaimable for upland cultivation

(iv) Those reclaimable as pastures

(v) Those reclaimable as forests

Soil conservation measures have to be taken up by the entire community for quick and effective results

Erosion can be worse than this. Action has to be taken before good cultivated land is completely eaten away by erosion and rendered barren as above

Such waste lands as are unfit for reclamation are recommended for bringing under pasture or forest. Such areas need restricted or controlled grazing (possibly enforced through legislation) and protection from excessive felling and fire till a sufficient vegetative cover has come up, after which a rotational or controlled grazing is recommended. The practice of shifting cultivation has also to stop, if soil erosion is to be arrested.

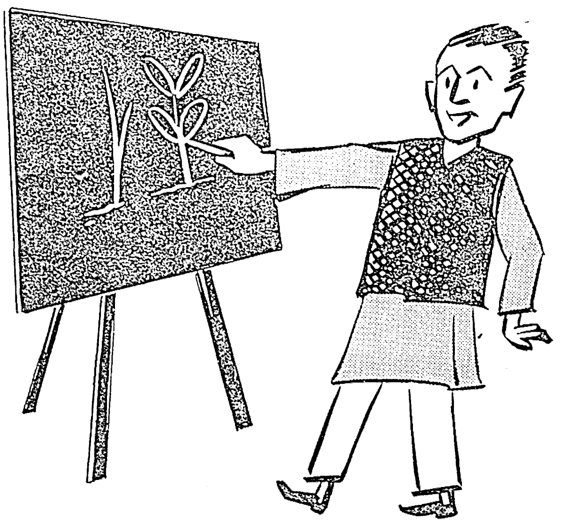
A POINT TO REMEMBER

The Extension service will also have to remember that soils become poor by use. They will, therefore, have to distribute improved seed and organic manures and fertilizers and also demonstrate to farmers and in their own fields the time, method and dose of application of these manures and fertilizers, so that they may build up the soil productivity. As with proper use of cultivated land, the use of forest land also has got to be impressed upon farmers. This means an efficient farm forestry Extension. This Extension will have to aim at the best land use of potential forest lands on farms. Lands which are less fertile, stony or otherwise not suited to agriculture should be devoted to forest. Marginal and abandoned farm lands should also go under forest land use. Farmers will need help in establishing, protecting and managing farm forests. The forestry Extension staff should impress upon farmers how forest farms can be a source of revenue as well as a means of controlling erosion on slopy and unproductive lands. They would also need help in getting the right type of plants for growing.

Soil surveys and soil maps will be a great help to Extension workers to apply results of research to the farms.

Above all, it would be good to remember that this programme can succeed only if farmers can be made to understand the importance of the problem and made willing partners in a work of such great importance.

As in other fields of Extension work, it will be a good rule to do a few things at a time and do those well in soil conservation Extension too.



From Blackboards To Flannelgraphs

DO you know that the blackboard is a simple but effective means of holding the attention of the group in meetings and discussions? By writing on the board as you progress with the discussion, you can also keep their attention on the particular subject you are trying to keep them interested in. A blackboard is also very useful in conducting literacy classes.

You can make a blackboard with a piece of ply-wood 30 by 40 inches. Paint this board with blackboard paint. Chalk and some kind of an eraser is all the other equipment you need.

If the board is to be carried from village to village, it can be made into two pieces and folded in the middle. Have a small strip of wood attached to one side of the fold so that it can be slid across the board after it is opened, and the board made firm.

When you conduct a meeting or a discussion, write the topic for discussion on the board, preferably in the form of a question like this: 'what is the best way to clean the village tank?'

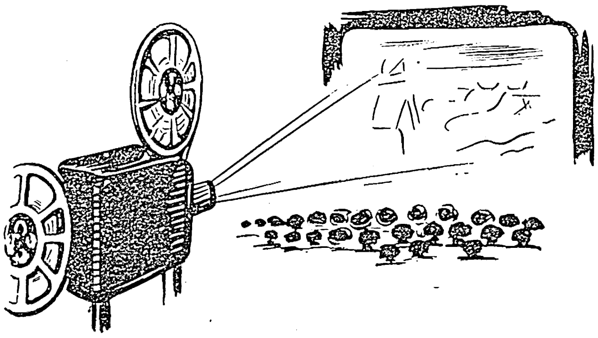
During the discussion, write under the topic the suggestions offered by the group. Also place on the board the suggestions that you have. It is good to put simple drawings on the board to illustrate points.

However, before actually using the blackboard in your meetings, practise how to do it properly. The following rules may be observed.

See that when you start the discussion, the board is properly cleaned. Use a clean eraser for the purpose. You should write in large letters, taking care that you do'nt fill the board too full. Avoid using abbreviations. Don't stand in front of the blackboard, stand to one side. You should not attempt to talk as you write, but face the group after writing and continue the discussion.

If possible, use coloured chalk—yellow chalk will be good at night.

The same blackboard can be used for the flannelgraph described elsewhere in this article. It can also be used for screen in showing filmstrips after covering it with clean white cloth.



MOVING PICTURES

Moving pictures are one of the most effective means of arousing interest. They attract even people who will not attend any other kind of meetings. They are also good for teaching. As long as good moving pictures are scarce, you may use them primarily to persuade people to attend meetings.

Good moving pictures can arouse emotions and change attitudes. They present facts in a real way, bring new practices to a village in a short time and reach illiterate as well as literate people.

In a moving picture we have the following advantages: the whole process can be shown in a short time, without having the worker to speak. People identify themselves with the characters in the picture and, in this way, they feel more closely to the subject.

Take care to select only those moving pictures for exhibition that are simple, direct, interesting and personal, and would lead to action.

As a general rule, you should give a small talk before a picture is shown. In this talk, the purpose of the meeting and of the picture should be explained.

The moving picture should not be used alone; it should be used in connection with a definite programme or a campaign and should be timely. It should be supplemented with literature, posters and demonstrations. What is more important is that after the picture, you should allow the villagers to discuss and to ask questions.

FILMSTRIPS

The use of filmstrips is one of the best ways to teach improved methods. A filmstrip is a series of still picture negatives on one roll. These nega-

tives are arranged together in such a way that they will tell a story or explain the steps of an improved practice. In a filmstrip, an entire process such as growing paddy, for example, can be shown at one short session.

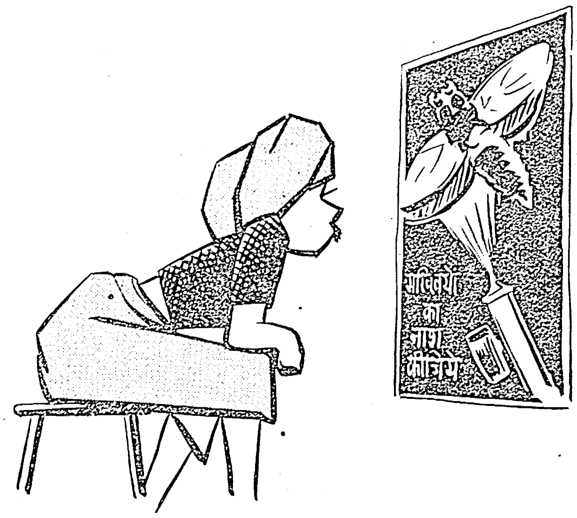
Filmstrips are shown with a filmstrip projector, a machine quite simple to operate. There are filmstrip projectors that do not require electricity. The whole equipment, including the filmstrips, does not require much space and can be carried easily.

Filmstrips have one distinct advantage: the pictures can be held on the screen for a long time. The villagers can thus also participate through discussions on each picture. Besides, the village worker with a camera can take good pictures of local practices and have them made into a filmstrip at a very little expense.

If you have not been using filmstrips you should contact your superior and ask him to make a projector available, if possible. In the event a projector can be made available, you must then find how filmstrips can be obtained. Some of the sources are: Development Commissioner; Director of Agriculture; Rural Information and Broadcasting Department; Education Department; Health Department; Indian Council of Agricultural Research; and others.

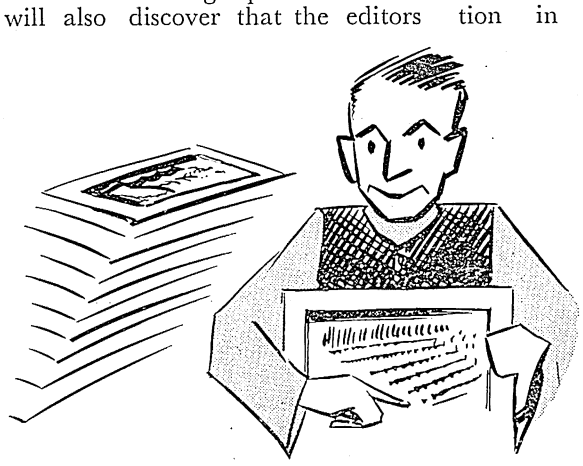
PHOTOGRAPHS

If a village worker can afford to buy any equipment, one of the first things he should buy is a camera. After using a camera, the village worker will discover that he can make interesting pictures. He will also discover that the editors of papers will become interested in his material if he gives them photographs also.



Photographs are especially suited to teaching illiterates. People love photographs and will certainly become attached to the village worker who can produce them. A good way to use photographs is to place them on a village bulletin board. These should be arranged to tell a story or to tell the steps in an improved practice. These should give accurate details, showing the results achieved before and after the adoption of the new practice. Good photographs used in this manner depict people as they really are, and are easily understood; they arouse action and emotion.

But photographs will have little value if they are not clear, dirty or too small, and are in bad taste. Only lively photographs arranged properly with a view to teaching can create the desired interest.



POSTERS

Another important visual aid essentially used as part of a systematic campaign or a teaching programme, is the poster.

A poster arouses mob psychology. It generates a feeling of obligation in responsive individuals. To be effective, posters must be put up at strategic points.

Apart from serving as an inspiration to the villagers by indicating official interest in the problem treated, a poster serves as a constant reminder to the people as long as it remains in the village. To be useful, therefore, a poster must be planned for a special job, such as mobilising public opinion in favour of 'killing flies', 'manuring paddy', 'culling poultry', etc. Posters may also be usefully employed to support local demonstrations or exhibitions.

A poster must be planned to attract attention of the people who are supposed to do the job. It must contain dramatic pictures from everyday life that will stop people and make them look at it. Besides being timely, it should influence people by persuasion and not fear.

A poster should be at least 20 by 30 inches in size and should be made in pleasing colours. It should tell the story in a single glance by having a few and simple words written in bold letters, and should attempt to convey only one idea.

Generally speaking, a poster should contain three main divisions. The first part should usually announce the purpose of the poster, the second set out conditions and the third recommend action. Each of these three main divisions may be suitably illustrated with art work, supported by brief language.

FLASH CARDS

When dealing with small groups of not over 30 people, flash cards are often used. Flash cards are used in the same way as filmstrips except that, in flash cards, the group sees the picture directly instead of seeing it on the screen.

Flash cards are made up of simple line drawings, photographs or cartoons in which plenty of colour has been used. A flash card must be large enough for every one in the group to see—at least 22 by 28 inches or even larger.

The story is told as each card is held before the group. Flash cards are usually used for telling a simple story describing one operation as applicable to local conditions. For example, it would tell villagers how to control mosquitoes or how to have clean water or how to make hay.

Ten or twelve flash cards should be sufficient to illustrate one talk. Most effective flash cards are planned by picking the main ideas from your talk that you want your villagers to remember, and figuring out the picture in each idea which will give a visual impact to the idea. To be successful with flash cards, it is essential that the story on each card is familiar to you. While telling the story, you must use simple words and local expressions, bringing in local names of people and villages.

Have the cards stacked in order. As one card is finished, it is slid behind the other so that it will be in order the next time it is used.

Hold the card in such a way that people can see it clearly. You must hold cards against the body and not up in the air. Turn your body toward the different parts of the group to show the card to all.

Point to important objects without covering the card, glancing down at the card as you tell the story. You can be more effective if you are able to show that you are enjoying doing the job.

As you acquire skill in this method of teaching, you may allow the people to participate in the discussion or in telling the story; this is bound to have better effect. If any one in your group is good at telling the story or leading a discussion, let him take the cards and use them with other groups.

FLANNELGRAPH

The flannelgraph is another device that can be used with advantage for illustrating your talk.

The flannelgraph works on the principle that some materials will stick to each other. Pieces of flannel or felt or sand-paper, for example, will stick on flannel when simply pressed against the background of flannel, and they will stay there until they are removed. Some village workers have also used *khadi* with success for this purpose. They have made *khadi* stick on *khadi* or sand-paper stick on *khadi*.

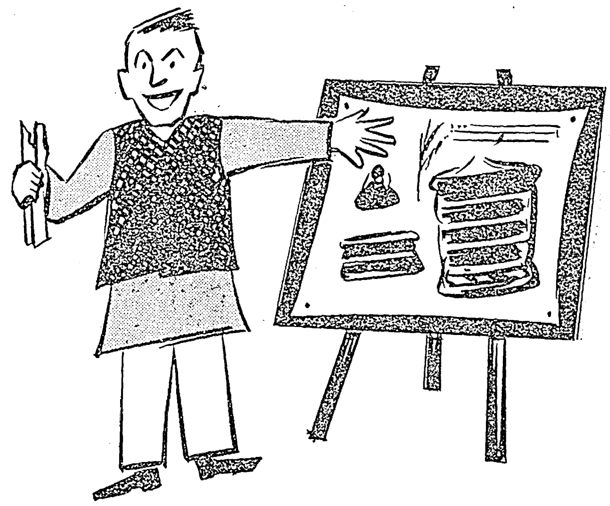
For instance, if scraps of sand-paper are pasted on the backs of photographs, these photographs will cling to a large piece of flannel. The same is true when sand-paper is stuffed to the back of drawings or lettering drawn on medium-weight paper. Even illustrations from magazines can be used for this purpose.

A flannelgraph is set up by stretching a large piece of flannel tightly and fastening it securely to a stand or blackboard. A 30 by 40 inch piece of flannel will be sufficient for any audience you may have. A good grade of cotton flannel with thick nap is best.

Prepare a flannelgraph story this way.

Serialise a few big and bold drawings, photographs or illustrations to form a simple story. Cut these from their paper back-ground and paste pieces of sand-paper on their backs. Medium or coarse sand-paper strips, an inch or so wide, should be fixed at intervals of several inches.

Before using the flannelgraph, put the title of your story in large letters at the top. It is then advisable to number and arrange each part of the story in the order it is to be added to the board.—*From the forthcoming publication "Extension Guide for the Village Worker."*



Research Note

WOOL FROM POLWARTH SHEEP

The analytical data presented here relate to the samples of wool from the Polwarth sheep supplied by the Sheep Breeders' Association of Australia. These are juxtaposed with the results of experiments in India for comparison. Analyses of wools of the improved Indian breeds of sheep, indigenous as well as cross-bred, are also reproduced here for the information of sheep breeders

THE Polwarth sheep, the cross of a pure Australian Merino with a pure Lincoln, was first bred by Mr. Richard V. Denis of Australia who worked at Tarud-warncoort. It is considered to be a medium-wooled sheep and its history dates back to 1880. With one exception, it is more or less concerned with three principal original and independently established flocks of Victoria and Tasmania, areas where the finest Australian wools are produced.

Four samples of wool from the Polwarth sheep received from Australia were analysed with the results indicated in Table I.

Von Bergen while describing the general characteristics of cross-bred wool type breeds (American Wool Handbook, 1948, p. 96) reports that the grade of the Polwarth wool ranges from 50s to 64s with a staple length of four to six inches, and a yield of 65 to 70 per cent. Although the results indicated in Table I confirm these characteristics, it appears that the samples analysed were taken from selected animals with finer quality wools.

MERINO AND RAMBOUILLET

In order to compare the wools of the Polwarth and other fine-wooled sheep, information in regard to the Merino and Rambouillet sheep has been collected from various sources and given in Table II.

The qualities and grades of the Merino wools within Australia are given below:

Name of wool	*Quality on shoulder*	*Fibre length (in inches)*
Victorian	70s to 90s	4½
Sydney	64s to 70s	5½
Adelaide	60s to 64s	5½
Queensland	60s to 64s	6
Westral	60s to 70s	6
Tasmanian	70s to 80s	3½

TABLE I

Description of the sample	Fibre thickness in microns: Mean	Fibre thickness in microns: C.V. (per cent)	Approximate count number (quality)	Mean fibre length (in inches)*	Crimp per inch	Yield (per cent)	Length classification
Ewe's fleece	21.14	22.4	60 to 64 s	5.34	12	68	Combing
Ram's fleece	24.66	21.6	60 s	4.96	10	66	Combing
Lamb's fleece	24.48	21.4	60 s	2.00	12	74	Clothing
Wether's fleece	25.73	23.3	58 s	7.30	8	72	Combing

* The period of growth is not indicated

TABLE II

Country	Breed	Grade or quality	Staple length (in inches)	Crimp	Yield (per cent)
Australia	Fine-wooled Merino	74s to 90s	$2\frac{1}{4}$ to 4	—	50 to 60
	Medium-wooled Merino	64s to 70s	3 to 4	—	45 to 55
	Strong-wooled Merino	60s to 64s	3 to 5	—	42 to 50
U.S.A.	Type A Merino } Type B Merino }	64s to 80s	$1\frac{1}{2}$ to 2	—	30 to 42
	Type C Merino	64s to 80s	$2\frac{1}{2}$ to $3\frac{1}{2}$	—	
	Rambouillets	58s to 70s	$1\frac{1}{2}$ to $3\frac{1}{2}$	—	35 to 45
Argentina	Type A Merino	60s to 64s	$1\frac{3}{4}$ to 2	—	35
	Type B Merino		2 to $2\frac{3}{4}$	—	40
	Type C Merino		$2\frac{3}{4}$ to $3\frac{3}{4}$	—	45
France	Rambouillet 1927	64s to 70s	$2\frac{1}{2}$ to $3\frac{1}{2}$	—	—
India	Merino } *	21.64u(64s)	4.88 } †	14	46
	Rambouillet }	23.40u(60s)	4.56 }	12	41

Note: In the case of India, analyses were conducted at the Poona Farm
* Imported † Mean fibre length

TABLE III

Type of sample	Origin	Fibre thickness (in microns) Mean	C.V. (per cent)	Approximate equivalent count	Fibre length (in inches)	Medullation (per cent)	Secured yield (per cent)	Crimp (per inch)	Per-year yields of wool in two clips lb.	oz.
Deccan Merino	Poona Farm	23.44	24.9	60s	3.61	—	46	12	1	14
Patanwadi selected	do.	34.26	38.4	48s	3.03	—	87	—	2	0
Deccani selected	do.	38.24	41.4	44s	2.30	—	85	—	1	10
Bikaner selected	do.	20.44	30.1	64s	3.72	—	71	8	4	14
Bikaner 'A' type	Hissar	26.55	34.2	56s	4.12	3	82	8	4	14
Bikaner lamb 'A' type	Hissar Farm	18.77	30.8	70s	—	—	80	—	4	10
Hissar	do.	24.24	28.9	60s	2.80	—	65	12	4	8

In reference to the areas of its origin, it is evident that the Polwarth breed has been developed from the finest wool-producing Merinos in Australia. A comparison of its wool with that of Merinos and Rambouillets shows that it compares only with lower quality Merinos like 60s to 64s, but compares favourably with the Rambouillets. The fibre thickness variation also falls within the range of the Merino wool (18 to 25 per cent). In some cases, the wool from the Polwarth may be 58s or below which comes in the medium or strong-wooled class. The fibre length and the yield are superior to those of the Merino or Rambouillet, while the crimp and other characteristics are comparable with those of the Merino type.

FINE-WOOLED INDIGENOUS SHEEP

For a comparison with indigenous wool types, analysis results of some local wools are given in Table III.

It is evident that some of the indigenous wool types are as fine as the Polwarth, and are also free from medullation. The fibre thickness variation is however more than 30 per cent, which reduces suitability of the latter for utilisa-

(*Continued on page 30*)

वर्षा का संकेत

SIGNS OF RAINFALL

कलसे पानी गरम हो, चिड़िया न्हावैं धूर।
अंडा लै चींटी चलै, तो बरखा भरपूर॥

If water kept in a vessel gets heated, the sparrows come down on the earth and dive in dust and ants move with their eggs, then it must rain heavily.

उत्तर चमकै बीजुली, पूरब वहनो बाउ।
घाघ कहै भड्डर से, बरधा भीतर लाउ॥

If wind blows from the east and lightening occurs frequently in the north, then Ghagh says to Bhaddar, 'Shelter thy cattle, as it will rain'.

जो बदरी मा खमसे,
कहें भड्डरी पानी बरसे॥

If the sky is cloudy and the weather sultry, then Bhaddar says, 'It must rain'.

बिरछां चढ़ किरकांट बिराजे,
स्याह सपेत लाल रंग साजे,
बिजनस पवन सूरिया बाजे,
घड़ी पलक माहें मेह गाजे॥

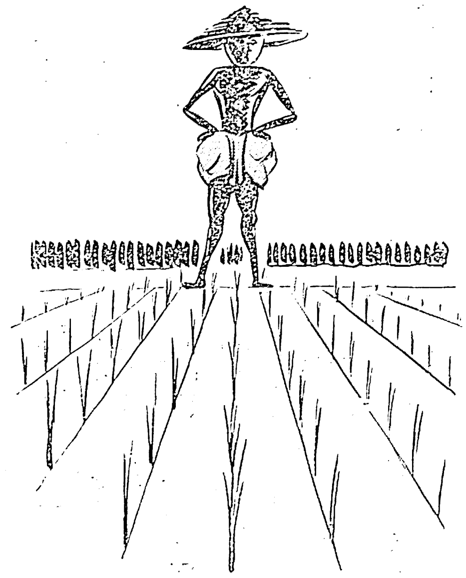
If the chameleon climbs up the tree and changes its colour red, dark and white, and strong wind blows from the north-west, then there must be a heavy downpour in the next few minutes.

THE EDITOR

INVITES YOUR QUESTIONS AND SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.


There are more Tractors on
Firestone Tyres
than on any other make !
When you see Firestone Tractor Tyres in action . . . . . . when you see the curved bars grip the soil for a firm, sure hold . . . . . . the flared tread openings keep the tyre clean . . . . . . and the wide, flat Firestone tread design give full traction contact—you will understand why there are more tractors on Firestone Tyres than on any other make. Ask any driver about Firestone Tractor Tyres and learn about their work-saving, money-saving advantages.
STRONGEST PULLING LONGEST LASTING
TYRES ON EARTH

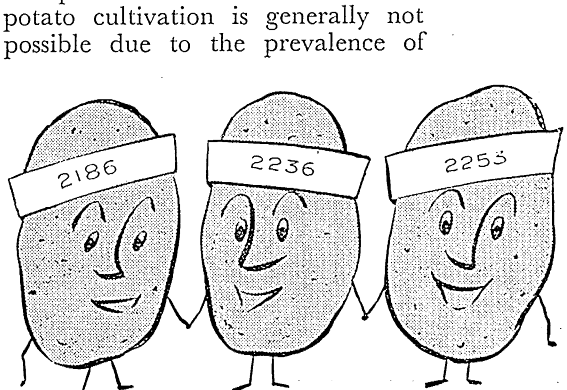
WHAT'S NEW IN FARMING



NEW POTATO VARIETIES

THREE new potato varieties evolved at the Potato Breeding Sub-station at Simla have been found to be superior in performance to the existing early-growing varieties for the North Indian plains. The three varieties are hybrid 2186, hybrid 2236 and hybrid 2253. The plants are erect and compact and when fully grown, present an impressive stand in the field. The varieties mature in two to two and a half months and give an average yield of 150 maunds per acre when planted in early season and about 225 maunds in the main season. They produce attractive tubers of a medium size with a white skin colour. The tubers also possess a good keeping quality.

These varieties are fairly resistant to virus diseases. Hybrid 2186 has also been found to do well in trials conducted at Koilpatti in the plains in South India where potato cultivation is generally not possible due to the prevalence of very short and mild winter conditions. Hybrid 2236 has given a yield of about 350 maunds per acre in some cultivators' fields in Patna.



Small quantities of seed of these varieties are being made available to farmers for trial by the Central Potato Research Institute, Patna.

HEAT IN COWS

EXPERIMENTS conducted at the Government Livestock Farm, Hissar, show that feeding special concentrates increases the frequency of heat (oestrum) in cattle. Among the concentrates tried, mixtures of *bajra* and gram and *methi* seed and gram were found quite efficient in bringing cattle into heat. The mixture of *bajra* and gram gave the best results. This will be of interest to livestock owners who can adopt this feeding method for reducing the long dry period found in some of the animals they maintain.

NEW COTTONS

TWO new varieties of cotton have been responsible for increasing the area under American cottons in the Punjab to about nine times of what it was in 1947.

The two varieties are 216 F and 320 F. The first one is recommended for growing in the south-eastern districts of Hissar, Rohtak, Gurgaon and Karnal. The other variety has proved more useful for growing in Amritsar, Jullundur, Ludhiana and Ferozepur. 320 F is early-maturing, and is resistant to jassids. It is also superior in yield to 216 F.

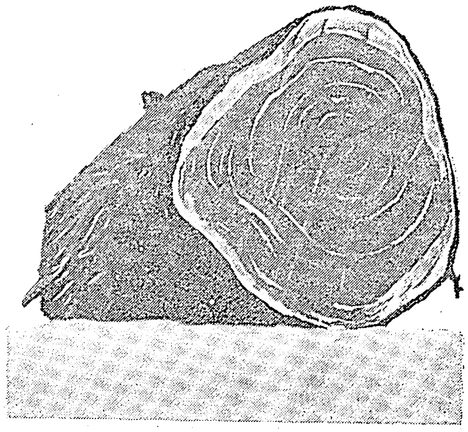
LINE-SOWING OF JUTE

LINE-SOWING of jute has been found to offer a number of benefits to jute-growers.

The quantity of seed required is reduced if line-sowing is resorted to. Intercultural operations and harvesting become easier. The furrows and ridges formed by interculture make the drainage problem simpler. Line-sowing makes the plants more uniformly spaced, as a result of which they can receive better individual care. A uniform quality and increased yield are other benefits derived.

The method also reduces the cost of cultivation. It has been found that while 60 labourers are required for weeding an acre of jute sown broadcast, only 10 to 12 are found sufficient for an acre sown in lines.

On farmers' fields, wherever line-sowing was tried, yields increased from seven to nine maunds per *bigha* and income shot up from Rs. 183 to 238.



Cross-section of a nearly ten-year old tree

MESQUITE likes the South

by

B.W.D. PONNAIYA, T.B. KRISHNASWAMY RAO and L. ANAVARADHAM

The popular plant of many purposes reigns supreme where many others generally fail

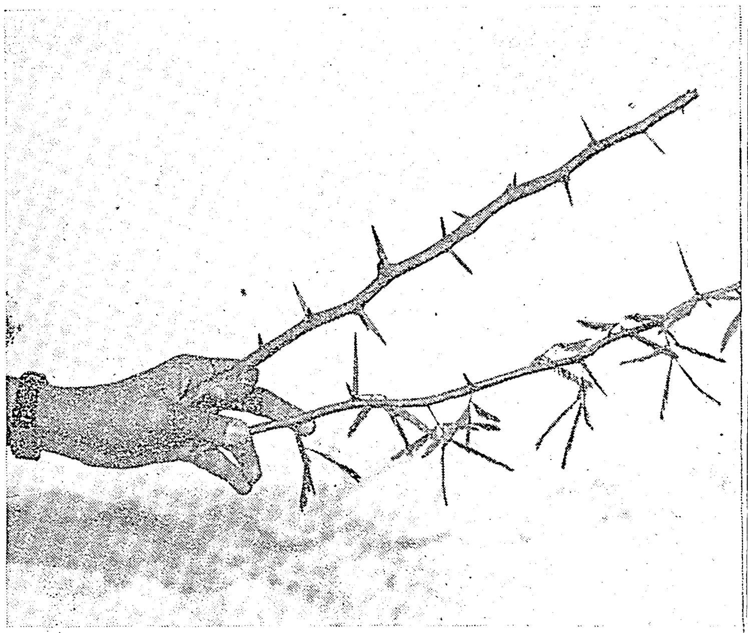
FEW people know that Mesquite was first introduced in India as long back as 1911. Since then this thorny leguminous tree has been spreading fast and is being liked wherever it has been introduced for the very many uses to which it can be put. Mesquite likes the South too. The Madras Department of Agriculture has been one of its staunch supporters because of its utility to farmers as an evergreen protective hedge, a fuel-yielder and one that gives wood good enough for furniture or agricultural implements.

The Department has been taking steps for wider growing of this tree in the barren tracts, tank beds, road-sides and along railway tracks in the State.

Mesquite hails from Brazil but has been widely distributed the world over these 50 years. Its ability to suit even arid regions, its thorny nature and its quick-growing habit have made it a welcome visitor wherever it has gone.

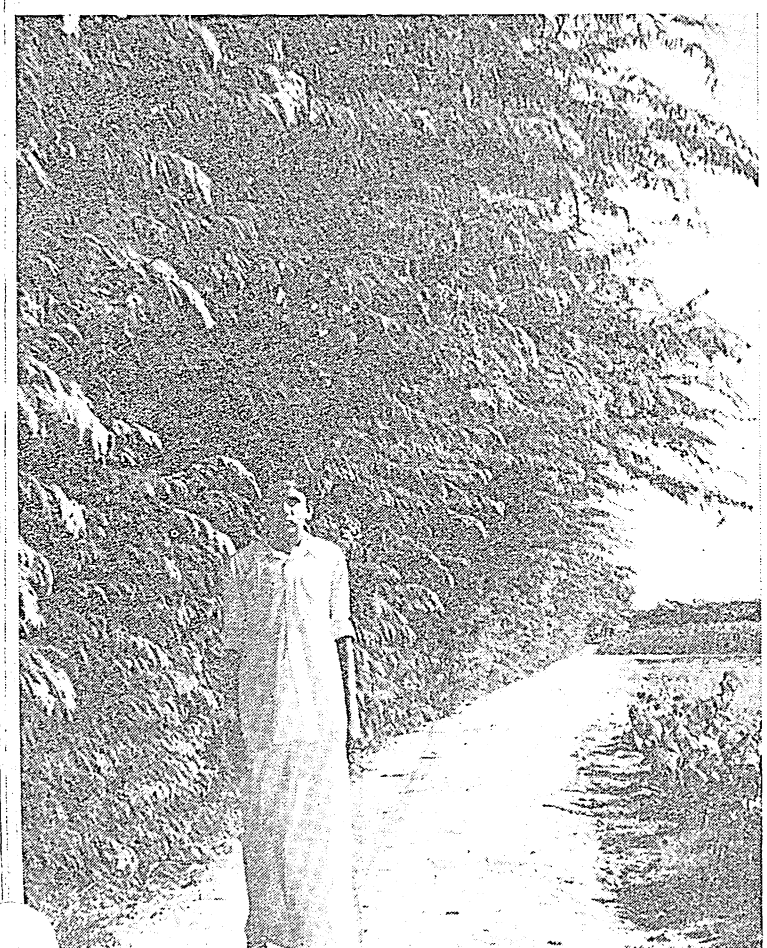
Even in the seedling stage, the plant is sufficiently deep-rooted. Seedlings barely six inches tall have been found to produce tap roots four to five feet in length. This deep-rooted nature and its tiny leaves have made this tree highly drought-resistant.

Mesquite branches showing the powerful thorns



The filling up of the top interspaces has been done by twisting the branches of adjacent trees. The bottom interspace has been filled up by raising seedlings at a later date

Side view of an eight-year old windbreak



Its non-palatability and the stout woody thorns produced by the plant have made it suitable for growing as a valuable live fence. The thorns are formed at the base of each leaf, often in pairs. The length of the thorn is up to two inches. The thorns drop off at the base in two years time, leaving the older stems smooth. Hence fresh branches have to be stimulated every year to keep the fence effective.

Its quick-growing long flexible branches give it a drooping appearance because of which the plants can be trained to form a continuous fence by twisting the young branches of two adjacent plants. As the branches mature, they become woody and it is not possible to disentangle them without cutting them.

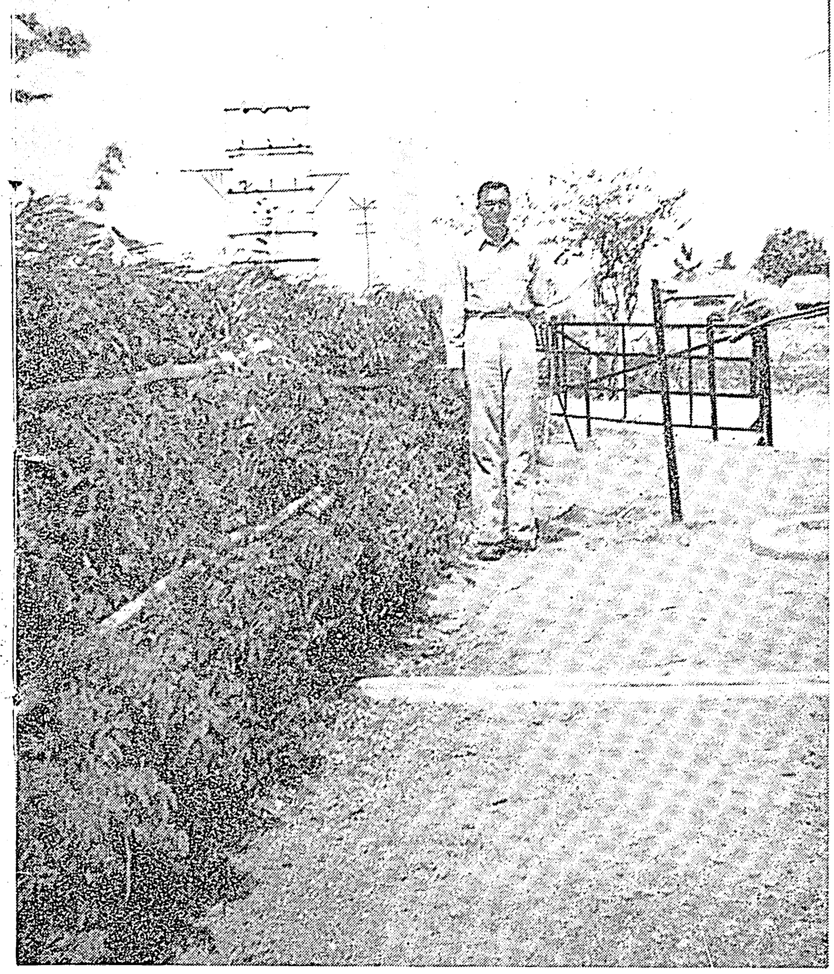
Although the plant is non-palatable, the ripe sugary pods, which drop down on maturity are readily eaten by cattle, goats and sheep. The seeds so eaten and voided along with the droppings of these animals are capable of germination. If these droppings are applied as manure, the field will turn weedy with the seedlings of Mesquite. In Central America, this plant has become a bad weed on cultivators' fields through this agency.

SEED EXTRACTION

The Mesquite seeds are small and hard and an ounce of them would contain nearly 1,010 seeds. The seeds are borne in long pods. The pods turn yellow when ripe and drop to the ground. When pounded, the pods break into bits along the transverse depression, each bit containing a seed. It is very difficult to separate the seed from these broken bits as they are hard and do not yield to mechanical pressure.

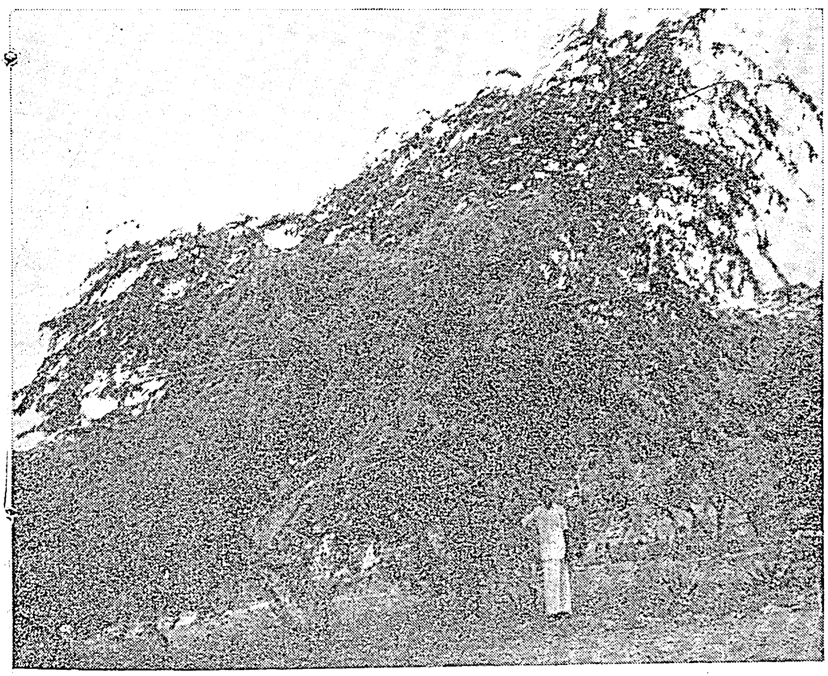
An easy method of seed-extraction has been evolved at the Agricultural Research Station, Kovilpatti. The broken bits are steeped overnight in cold water and dried in bright sunshine on the next day. Thus treated, the hard cases enclosing the seed snap open along with the suture when mechanical pressure is applied to them. The dried matter is pounded in a mortar with a wooden pestle with iron tips. For each charge, broken quartz (about 1/10th of an inch in diameter) is added which not only facilitates husking but also improves the germination capacity of the seeds. Tests conducted on the seed so obtained showed 80 per cent germination as against 25 per cent of the hand-extracted seed. The extraction percentage of seed is 10 per cent of the pod weight.

In Hawaii, they say, Mesquite flowers afford a good bee-pasturage and that out of the annual production of 600 tons of honey in that island; about 200 tons are derived from Mesquite alone. Observations made at



(*Above*) *Side view of a one-year old fence*

(*Below*) *A full-grown, almost ten-year old tree*



the Agricultural Research Station, Kovilpatti, show that the plant flowers throughout the year and this is the only bee-pasturage available during the droughty parts of the year.

RAISING MESQUITE

For raising a hedge or a windbreak it has been found necessary to dig a trench one foot by one foot and fill it up with prepared soil. The seeds are dibbled during the soaking rains of the monsoon. Better germination is obtained when seeds are soaked in cold water for four hours prior to sowing. Since the plants are drought-resistant, there is no necessity to irrigate them. In case a quick growth is desired, the plants may be irrigated.

Seeds are sown in a single line one inch apart. One ounce of seed is sufficient to sow a length of thirty yards. When the seedlings are about three weeks old, they are thinned out to a spacing of three to four inches. The second and final thinning (spacing six to eight inches) is done when the plants are one foot tall. At this stage, the top shoot is pruned which stimulates four to five basal branches. The tops of branches can be trimmed again when they are three feet high. It is preferable to close up the branches which grow away from the fence with bamboos. Thereafter, the plants may be pruned to the desired height of six feet, preferably at the commencement of the rainy season. This pruning stimulates a large number of new branches which can be twisted with those from the adjacent plants to form an impenetrable fence.

For securing a windbreak the final spacing between plants should be nearly two feet. This allows the stems to grow in girth. In this case also, the two top prunings should be done when the plants are one foot and three feet high. Instead of arresting the growth at the sixth feet, the plants should be allowed to grow and pruned when they are 12 feet tall. The twigs of the adjacent plants are twisted with each other in the tender stage. The branches which come away from the sides are to be pruned periodically to stimulate fresh basal growth, and these can be trained as they come up.

The plant can be grown to big trees. In ten years' time the tree reaches a girth of nearly one foot and a height of 40 feet. The wood can be used as fuel and also as timber. It gives a strong wood of pinkish colour useful for manufacturing local agricultural implements. It can also be used for making furniture as it is capable of taking a good polish.

(*Continued from page 11*)

COTTON

Specifications framed for cotton take into account its purity and factors like moisture and presence of leaf, seed stains and other impurities. For the present, grading of cotton is confined to the certified pedigreed varieties in Bombay State.

However, merely the drawing up of grade specifications does not end the matter. It is necessary that all those engaged in the marketing of agricultural produce cooperate in popularising and making the system a success all over the country.

(*Continued from page 13*)

Poultry-keepers, therefore, can utilize both the fractions of processed cow manure for their growing and laying stock. The water extract which contains the growth-promoting factors and the male sex hormones can with profit be included in the ration for growing chickens so that they may have better growth, better feathering and better development of combs and wattles. The water-extracted residue which probably contains female sex hormone factor can conveniently be included in the laying ration at eight per cent level for increasing egg-production and also for effecting a saving in the cost of poultry feed.

(*Continued from page 7*)

in British Solomon Islands. The single row rice land weeders are being sold by Indian firms at a cost ranging from Rs. 15 to 20 each. The Rice Experiment Station at Karjat in Bombay has also designed a cheaper model.

The original Japanese model of the single row rice land weeder had a width of $5\frac{5}{8}$ inches and it could work in a transplanted field where the row-width was more than eight inches.

The number of rice plants per acre and the row widths of transplanted paddy differ from state to state, but it should not be necessary to have an implement for each pattern of planting. Hence we have fabricated single row weeders with three different widths of four inches, six inches and $7\frac{1}{2}$ inches. The handle bars are of the single rod pattern or built of two rods. All salient features in the original design have been retained in the new ones. In all the three types, the angle of pushing and the depth to which the weeder should penetrate can be adjusted.

(*Continued from page 22*)

tion as a good clothing wool. Even such qualities of wool are very few in India, a majority being the coarse carpet types. There is also greater variation in the fibre length of the finest indigenous wools as compared with the Merino, making them less suitable for worsted manufacture. Some of the other physical characters like softness, pliability, strength, colour, etc., are also lacking in the indigenous wools as compared with the Polwarth wool sample.

Looking for a complete food?

The egg dishes you would like

IF you are looking for a food complete in itself, then you better think of eggs, because you cannot think of any other food that is cheap, easily available and easy to digest. The egg is a good food for young and old. For growing children there is none better.

The egg is a food *par excellence*. Most of the vitamins and minerals lacking ordinarily in our diet are found concentrated in it. The egg contains protein of a very high value needed for body growth and repair of tissues. The egg is also a good source of vitamins A and D as well as some of the B vitamins. The presence of these vitamins helps you to keep off respiratory infections like common cold and bronchitis and eye symptoms like night blindness, build up a strong nervous system and a good digestion, assure good teeth and bones, and help prevent deformities in children.

The egg-yolk is a rich source of vitamin D, which is so essential for children. Children should be given eggs at least four or five times a week.

The egg has many of the essential minerals required for good nutrition. It is rich in calcium, phosphorus, iron and sulphur. Calcium and phosphorus build strong bones. Iron prevents anaemia. Sulphur is needed for the hair and nails.

CARE IN COOKING

Nutrition experts are never tired of singing the praises of the egg. To get the best out of an egg, however, the housewife should pay sufficient care in cooking it. The first principle she must remember in cooking eggs is to cook them on a moderate fire whether she is cooking them in water, frying-pan or oven. Eggs cooked with a high heat have, like all foods rich in proteins, a tendency to become stiff and leathery.

Eggs should never be over-cooked. In boiling eggs, cover them fully with cold water and then gradually heat the water to the boiling point but never plunge them into boiling water at the beginning itself. To get soft-boiled eggs, boil them only for three to four minutes and to get hard-boiled eggs for seven minutes.

For frying, break the eggs into a saucer and slip them into a frying-pan containing *ghee* or vegetable oil. Cook over a moderately hot fire until the whites are set.

Scrambled eggs are prepared by beating two eggs with two tablespoons of milk and seasoning with salt and pepper. This is poured into a frying-pan containing *ghee* and continuously stirred over a low fire until it thickens. When served hot you will love its flavour.

The taste of scrambled eggs can be improved by adding cooked tomatoes. For every three or four eggs, one cup of cooked tomatoes will be required. Similarly, scrambled eggs with bread crumbs, previously browned with a little *ghee*, or chopped onions or green pepper can be prepared for getting better flavour.

Another way of serving eggs is by preparing omelettes, either plain or with vegetables.

STORING EGGS

Here are a few tips for the huosewife for storing eggs. Eggs are stored best when the shells are cleaned. Before storing, all soiled spots on the shells should be wiped with a damp cloth. But eggs should not be washed till just before using them because the washing removes the protective film on the shell which closes all the pores of the egg and helps in keeping out bacteria and bad odours. Eggs should be stored in a covered vessel or bowl, away from strong smelling foods. Without a cover, eggs are bound to lose moisture faster and are more liable to absorb outside odours. Eggs should always be stored in a cool place.

FARM FLASHES

On an average, about one lakh cattle worth more than two crores of rupees die in the Indian Union due to rinderpest alone

Paddy yields can be increased by 32 to 140 per cent with the application of nitrogenous manures; the response obtained on irrigated wheat is of the order of 10 tons of grain for one ton of nitrogen applied

There are about 500 million acres of arable land in India out of which 60 million acres are irrigated and receive an assured and regular water supply

Only one millionth of a millionth of an ounce of (plant) hormone is required to cause a growth of half an inch in plants

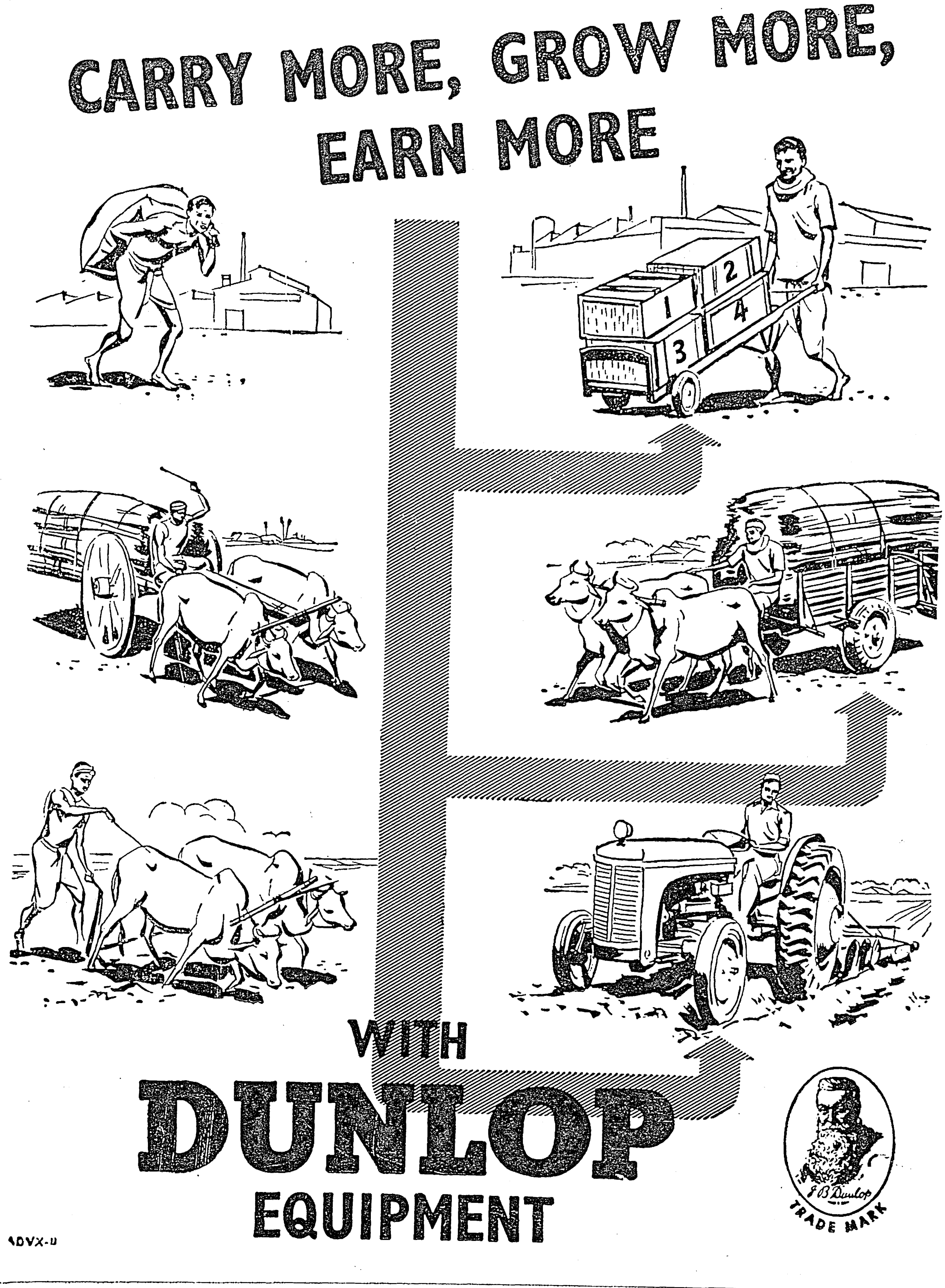
By inducing anaerobic fermentation of cowdung, gas containing methane and hydrogen can be produced for use as an illuminant in mantle lamps

India is the largest single sugar-producing country of the world, possessing 30 per cent of the total world cane-acreage

Compared with potato, sweet potato is richer in carbohydrates, calcium and vitamin A

Only about one-half of the water delivered at the head of a canal actually reaches the field, the rest being wasted in the manner: 17 per cent in the main lines and branches; 17 per cent in distributaries; 25 per cent in cultivators' water courses

Warble flies *Hypoderma lineatum* and *H. Crossii* cause a value-depreciation of the order of a little less than two crores of rupees in the hides and skins produced in India every year



National Printing Works, Delhi (India)

Regd. No. D 571

Indian Farming

13 Dec 1954

December 1954

Indian Farming

VOL. IV DECEMBER 1954 No. 9

CONTENTS

EDITORIAL BOARD

SUBSCRIPTION RATES

Annas 12 per copy Rs. 9 for 12 issues Rs. 4-8 for 6 issues

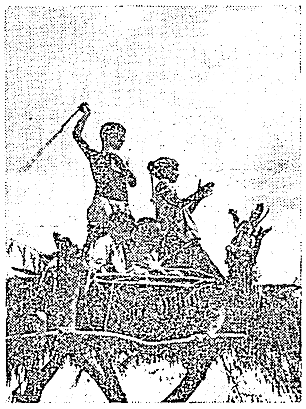
ISSUED BY

THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

TWENTY-FIVE YEARS

THIS month, the Indian Council of Agricultural Research will be celebrating the completion of 25 years of research in the field of agriculture and animal husbandry. The Council was established in 1929 to undertake, aid, promote and co-ordinate agricultural and animal husbandry education, research and its application in practice, development and marketing by such means as would increase scientific knowledge of the subject and secure its adoption in everyday practice, and to disseminate information on improved practices to farmers. During the 25 years, the Council's programme of work has been of an ever expanding nature, embracing all important aspects of crop and animal husbandry. It has to its credit results of research which when applied in practice are capable of bringing better harvests to millions of farmers all over the sub-continent. Wherever these results have been put into practice, farm yields have increased anywhere from 20 to 100 per cent or more. Similar benefits have also accrued to farmers as a result of the Council's livestock research schemes, touching all aspects of breeding, feeding, management and disease control. The initiation of the key village schemes is another of its long chain of achievements. Research work in poultry farming, dairying, fisheries and bee-keeping has now made it possible for farmers to have a valuable subsidiary industry alongside farming. The Council's schemes in the field of Extension also have borne fruitful results. Not the least in importance of schemes is the one designed to bridge the gap between the laboratory and the field by periodically conveying to the farmer, in the language that he understands such results of research as can be gainfully applied to farming and stock management. *Indian Farming* has been striving to put before farmers the results of scientific investigation in a simple and informative manner, so that they may harness science to agricultural industry for their benefit. It is a heartening sign that more and more farmers are realising the benefits of research and adopting such measures as have been proved beneficial by scientific investigation. The country's progress can be measured only when there is a substantial follow up in the field after the laboratory has shown the way things can be done best.

OUR COVER



When the grain is ripening the farmer's vigilance increases. Bird-scaring is an interesting job for the children especially when there are a number of them together at it. The boy in the picture told our photographer with obvious pride, "the birds are so scared of me that I need'nt use a stone for the sling. I just use the sling and it serves the purpose." The sling was just a piece of rope

THE GRAND OLD MAN OF SARGONDI

"LET me introduce to you Sardar Basant Singh, the grand old man of Sargondi," said Agricultural Inspector Pal Singh, when I visited Sargondi, a small village in tehsil Phillaur of Jullundur district in the Punjab, a few months back. I really admired the man when I came to know more about him.

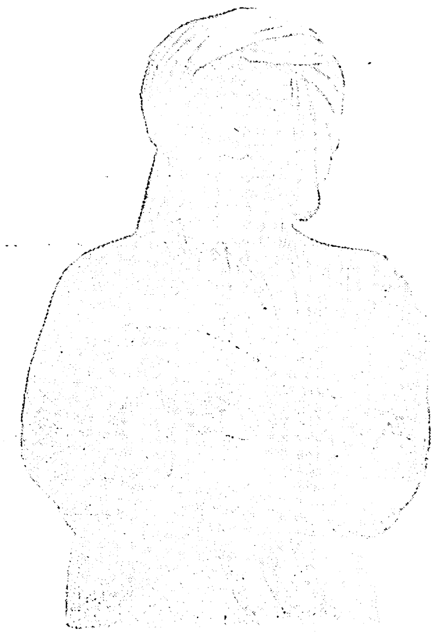
A successful farmer himself, and a popular figure of his area, Sardar Basant Singh is famous for having infused a spirit of progressiveness among fellow-farmers through his steadfast devotion to the ideal of rural uplift. He has spent a major part of his 70 years in goading them to action for achieving the goals of better farming, better yields and better living.

In 1921, when he set about the arduous task of consolidation of holdings as a first step towards agricultural improvement with the help of the State Department of Agriculture, he realized that there was no short cut to the realization of his dreams. But he fully banked upon his inexhaustible store of patience, and advanced with confidence. He is now proud of his achievements which are by no means meagre.

When everybody was reluctant to deviate from traditional farming for getting benefits that seemed 'doubtful', and some even scoffed at the idea of "fiddling with our main sustenance", he took to the cultivation of improved varieties of crops such as wheat, cotton and sugarcane himself, and wiped away the misapprehensions of his fellow-farmers by obtaining bumper yields. He was also successful in introducing improved agricultural practices such as line-planting of sugarcane, line-sowing of cotton, cultivation of paddy by the Japanese method, a liberal use of fertilizers, manufacture of *gur* with improved furnaces, etc. The farmers around him also picked up from him the use of improved agricultural implements, namely, furrow-turning ploughs, kisan hoe, bar harrow, cotton drill, etc.

His was the first village in the area to get electricity, and he immediately installed a tube-well and a power-crusher for sugarcane in his farm; and through his efforts, Sargondi can now boast of as many as 22 power-operated pumping-sets.

One such worker a village, and the condition of lakhs of villages dotting the country would be transformed into one of happiness and prosperity.—**H.K.S.**



Dev Prasad Singh

MAKES HIS SMILE WORK FOR

by

S.P. Ambasta

THE Indian village is such. Probably, it was meant to be such, so that the community that lives in it may be very well-knit. What I mean is, the village dweller, be he a labourer, a farmer or anybody else, cannot live for himself. He has to lend a helping hand to his neighbour and to the community, if village life has to be happy and prosperous.

This was forcibly brought home to me when I met Dev Prasad Singh the other day. He farms on a 40-acre land in Sipara village in Patna district in Bihar. " You say improve your agriculture," he told me, " But I would say improve your agriculture as well as your village."

I was curious. I talked to Dev Prasad Singh. I had prepared myself to meet and talk to a good farmer, but now I was talking to a village leader as well.

Dev Prasad Singh is 50 and he has seen floods visiting his village a few times. He recounted to me how a decade ago the river close to his village had come into spate with some unusually heavy rains. Water had begun to overflow the banks. The village seemed to be at the mercy of the overflowing water. Dev Prasad Singh knew that if the river was not checked by means of a bund quickly, the village would be lost.

" But the question was how to erect a bund in such a short time ", he said, " we had no money. But we had the desire to erect a bund. The desire had to be translated into action and everybody was waiting for somebody to come forward and organize a working party. I went out to my community and requested the members with my folded hands that they all join me and put up the bund. I had pinned all my hopes on this appeal. The folded hands brought the needed response. All men of the village worked day and night and we made it. It took us just four days and the bund saved the village, its 125 houses, 3,000 head of cattle and acres of rice."

Dev Prasad Singh's experience is rich. He thinks that the desire for co-operation is there in every villager's heart but it is dormant. It has to be roused, and so far as Dev Prasad Singh is concerned, he does it with a smile and folded hands. That energises the laziest man into action.

Dev Prasad Singh narrated to me other occasions when he had to go out to his community, and every time how he had succeeded in getting them work on some project or the other for the welfare of the village.

The village suffered from poor sanitation. Till six months ago there was no drainage in the village. The dirt and filth were scattered all over the place. This time too Dev Singh took the lead. He got the

village folk to meet and decide that they all work a day in the week. Now, the village looks cleaner and is healthier.

Similarly, the villagers have constructed a school and a library. The village boasts of a *Nav Yubak Sangh*, akin to Farm Youth Club. " Next winter we are going to fix up a tube-well for *rabi* irrigation," said Dev Singh, " and all these things so far done or being done are without any Government help. We have done it ourselves and we want to do everything ourselves."

A BUND IN 48 HOURS

As we talked, we came over to a freshly prepared bund. I was told that it was finished just two hours before I had reached this village. The village had enough of rain in the early weeks of August. According to the practice here, rain water has to be stored in a ditch for irrigating paddy in September-October when the chances of rain are rather slim. But the ditch had no bund to check the overflow of the accumulated water.

Dev Singh was worried as he anticipated the overflow to damage the rice fields. More than that, there would be no water for irrigation in October. This leader then had approached the village people and explained to them his fears. Again, his smile and folded hands became an irresistible appeal to them. In 48 hours they had completed the 50-feet bund.

With a twinkle in his eyes Dev Singh said, " Now our rice and *makai* crops are safe. We are sure to have a good harvest."

LIKES JAPANESE METHOD

So much for Dev Singh's leadership. Next we

Dev Singh beside his paddy field. He is confident that next year all the rice-crop in the village will be raised by the Japanese method

BUILDING A BETTER COMMUNITY

Sipara men preparing to leave for home after they had completed the big bund after a stretch-work of 48 hours

visited his farm situated in the heart of the village. Surely, Dev Singh has had a good inheritance from his forefathers—not so much the land as the experience. Here I saw that not a patch of land was idle. A few acres had maize grown for fodder. The rest of it was all rice. The farmer had seen the Japanese method of growing paddy in village Gopalpur close to his own, last year. That made him stay in that village for a few days so that he may learn the technique of the new method.

Shrewd as he was, he came back and replanted rice in one of his plots to test.

" The result was quite exciting. I got a yield of 19 maunds of grain per *bigha* by the Japanese method as against 12 maunds by the local method," said Dev Singh. This year he got the boys of the Patna Extension Training Centre for demonstrating to the villagers the new method. "Most of us", he said, "have adopted this method now and by next year, I am sure, the local method would have certainly disappeared completely from this village."

There was one interesting aspect of rice-growing that Dev Singh explained to me. Here, in the village rice is sown broadcast. But the Japanese method advocates line-sowing. Dev Singh considers that this is the one great principle in the Japanese method. " This principle can also be adopted in the direct sowing that we do here. We are now sowing in lines and that has cut on our seed and we are raising very healthy and robust plants."

This visit to Dev Singh was a rich experience to me and when I left, I left with the conviction that a humble smile and folded hands were far more powerful than any other method of approaching the villager I could think of.

Let them have comfort, warmth and protection, and watch them perform better

Housing Your Poultry

by

S. G. Iyer

THE village poultry-keeper pays rather poor attention to the housing of poultry. He generally puts them in mud chambers or packing cases during night time. Such houses give a certain amount of protection from their natural enemies. Others shut their birds in baskets of about three to four feet in diameter and place heavy stones on the top so that they may be saved from jackals, dogs, cats and such other animals. Some others do not bother about poultry-houses at all. The birds are allowed to roost on the walls of the houses where the poultry-keepers live.

But you as a poultry-keeper should go in for a better housing for your birds so that they may be comfortable, have adequate air inside, be protected from wind and sun and have freedom from too much moisture.

The house should be exposed on the eastern or south-eastern side so that a western wind is avoided. Tree plantations like mulberry and citrus are preferable. But they should not be too close to the house.

The construction of the house should be simple. It should also be free from ticks. Houses made of wood often invite tick and other parasitic troubles. The house should be easy to disinfect.

On model poultry farms chicks are reared in permanent or portable brooder houses with arrangements for artificial heating. After brooding, the birds are kept in houses made of single iron bars covered with wire netting placed under thatched roofs. A desirable size of the house is 6 ft. × 3 ft. × 4 ft. Asbestos or galvanized iron sheets may also be used for the top.

In urban areas, special poultry cages made of iron and wire netting are recommended to poultry-keepers who are keen of adopting an improved system of housing.

A hen requires approximately four square feet of floor space while a room 10 ft. × 10 ft. can accommodate 150 chicks up to eight weeks during brooding.

Many poultry-keepers fail to realize that chickens spend considerable time on the roosts. For layers, the roosts can be placed towards the back of the house about nine inches above floor level. It is good to fix circular tins containing water and kerosene on the iron rods supporting the perches, as this will provide protection from ticks during night time. Where there are rows of roosts, the space between two should be about 15 in.

Water fountains, mash hoppers, nest boxes and crates are some of the commonly used equipment in poultry houses. For brooding chicks, it is very important to use litter on the floor. For this purpose, paddy straw, wheat *bhoosa*, sawdust, sand, fallen leaves or paddy husk may be used with advantage.

Coops for breaking up broody hens are also necessary in poultry houses. The coop should give the birds access to feed and water and should be easy to clean.

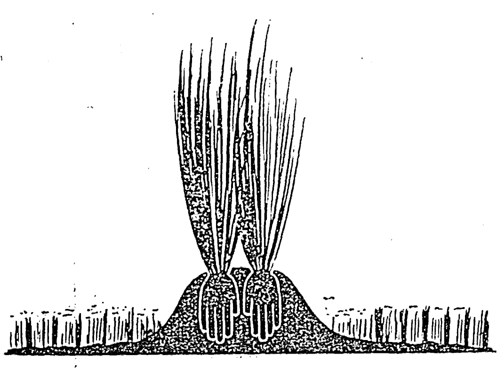
If fowls are allowed to run, the soil should be sandy loam, so that there may be good drainage and grass and other green crops may grow well. When hens are allowed to run, proper laying nests are necessary. Earthen *gamlas*, 18 in. in diameter and nine inches deep, may be placed in the corners of the house for the hens to sit and lay. Three hens can be easily managed with one *gamla*. Ashes or sand with a small quantity of flowers of sulphur may be placed in the earthen vessel so that the eggs may not be broken.

Layers may also be kept in cages or batteries for the production of table eggs. In urban areas, the use of laying batteries for backyard farming is becoming more and more popular. Hens may be kept confined in cages suitably placed in buildings up to a year. Each hen, however, is given an individual compartment, about 16 in. wide, 18 in. long and 18 in. high. This would be a good system for adoption in localities where land is scarce.

This poultry pen is a good one to copy

GRASSES ON FIELD BUNDS

FARMERS in Bombay State are being advised to grow grasses on bunds wherever contour bunding has been done by them. These grasses will not only prevent the erosion of the bunds during rains because of the vegetative cover they provide, but also will hold the earth together with their root system. The grasses will be very good green fodder for cattle too. The Bombay Department of Agriculture is prescribing such grasses as Marvel, Thin Napier, Blue Panic and Rhodes. Farmers generally allow wild type of grasses to grow on these bunds which are not useful to them. They can even grow *hariali* and *kunda* in which case a vigilant watch will have to be kept by them to keep these from spreading on to the fields. The grasses are best seeded when the monsoon sets in.



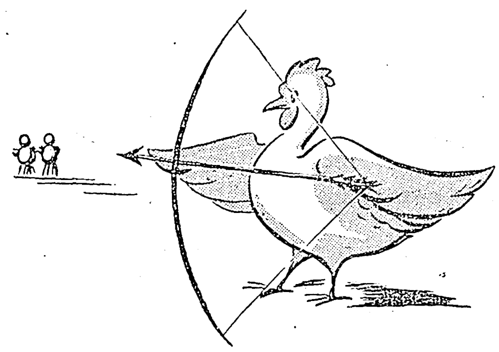
SUBSOILING REDUCES WILT

SUBSOILING operations have been found to be highly effective in the Punjab in fighting the wilt disease of gram. The operation has also been found to increase grain yield. Subsoiling can be done easily up to a depth of 12 in. during the monsoon season with a tractor plough using one bottom, weighing it down with about 200 lb.

Year before last, in an experiment, it was seen that the gram crop following the extra deep ploughing showed a remarkable decrease in the wilt disease, at the same time yielding a larger quantity of grain. Last year, the residual effect of this operation was also watched. It was found that the wilt had been reduced to negligible proportions and the grain yield had further increased. From past experience, it is clear that subsoiling beneficially affects the third successive crop of gram also. The operation, though costly, is lucrative in the long run.

TICK FEVER IN FOWLS

TICKS cause a fever in fowls called tick fever which has been found to be a serious disease, especially in the villages. One of the important sources spreading tick fever among healthy birds is the infected luggage vans of railway trains. Very often, healthy stock despatched from poultry farms by railway contact



the disease in transit and suffer heavy losses at the destination. Poultry farmers are advised that immediately a consignment of birds is received by rail, they should examine them for seed ticks on their body, especially under the wings and between the legs and pectoral muscles. If any are present, the bird should be suspected of suffering from tick fever. Veteri-

narians also advise that the birds should be dusted with insecticides such as 'Gammexane' and 'Hexyclan' which will destory the ticks. All birds infected with ticks should be got injected with the help of a veterinary doctor to put down the disease before it takes a serious form.

BLACK SMUT OF WHEAT

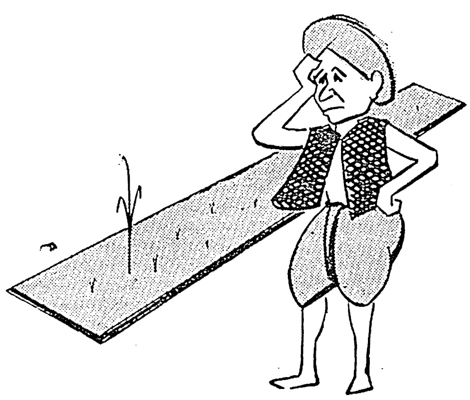
A COMBINATION of different measures recommended for the control of the black smut disease has given such encouraging results in controlling the disease, that farmers are being advised to adopt them and get smut-free wheat crops.

Black smut is a disease caused by a fungus. It is very dangerous, but since it is not only carried on the seed but also infects the soil, control is rather difficult. The disease is seen when the leaves in the late seedling stage begin showing narrow red-grey streaks or stripes running parallel to the veins. Later on, the leaves get twisted and curl and droop before withering away. The entire plant dies down early and those that survive either do not produce any ears or if they do, no grains are formed.

The three recommendations—early sowing, sowing a smut-resistant variety and chemical disinfection of disease—were combined in the new experiment tried for disease control. The crop was sown on the 27th October as against the normal sowing time of November-December. *IP 165*, a smut-resistant wheat variety, was sown. The seed was dressed with copper sulphate dust before sowing. The experiment showed that the grain by this combination treatment gave a uniform increase during the three years the experiment was conducted.

FUNGICIDES FOR PRESERVING SEED

FARMERS in certain localities have to sow their rice a little later in the season or sometimes even as late as December-January. It is their experience that the seeds stored for these late sowings lose their germinating capacity a great deal because of the wet humid months of the monsoon season. Some of them, for this reason, even get the seed from a specially sown seed plot in the main season or import it from a neighbouring drier region. Experiments at the Central Rice Research Institute at Cuttack have now shown that the rice seeds can well be preserved even during the monsoon months safely if they are treated with some fungicide. At the Institute, seed treated with fungicide retained its germinating capacity from April up to the end of October, as against the untreated seed which showed a setback in germination after June and lost it completely by October. The cost of treatment was found to be just about an anna for every 10 lb. of seed.



A vital need of animals that gets overlooked on many farms

Water Needs of Farm Animals

by
GURBAKHSH SINGH MAHAL

FEW farmers appreciate the need of an adequate supply of wholesome water for livestock. Water forms an important constitutent of the animal body. It also is of absolute necessity for feeding, chewing, digestion, absorption and movement of foods within the body. Water helps the various organs in their functions and assists in regulating the body temperature.

On all farms, a supply of plentiful, fresh and pure water at all times should receive the first attention. If animals have to go too far to obtain water, they do not take the trouble to do so often and hence may not get enough to meet the needs of the body. The water should preferably be soft, though of course hard water does not cause harm and animals get accustomed to it after some time. In all cases, however, the water should be well aerated and free from dust or smell.

In the cold weather, animals are likely not to drink enough if the water is cold. It should, therefore, preferably be warmed slightly or the animals should be given the opportunity to drink more frequently.

During the hot weather, animals need more water than at any other time. This is especially true of horses and cattle at hard work because of their sweating heavily, and they need more frequent watering in the summer. However, animals warm from working, like horses and bullocks, should not be allowed to drink as much as they want till they have cooled off.

Water should be made available in clean troughs or other equipment which can always be kept clean. The troughs or utensils used should be cleaned at least twice a week. Watering troughs for animals found in towns and cities are not always clean and are likely to bring disease infection, and as such it is advisable to supply water to the animals individually from a pail.

COWS

Of all farm animals, cattle, and especially cows in milk and young growing animals, require the largest quantity of water. The average consumption of water by cattle varies from 10 to 15 gallons per head per day according to the size, the nature of food, the temperature and milk yield in the cows. Usually, cows consume four to five and a half pounds of water (including the water in their feed) for each pound of milk they yield. They may drink 80 per cent more of water in the hot weather.

Cows, as a rule, should always be watered twice a day. In severe hot weather, this may be increased to thrice daily. Cows having a free access to water at all times usually produce more milk than those that get water at some fixed hours.

HORSES

A horse will require from 5 to 15 gallons of water daily. Hot weather and hard work, however, will make its requirements almost twice this quantity. The horse needs watering thrice a day, but twice a day may be found sufficient in cold weather when it is not at work. Similarly, during the warm weather and when it is in work, the frequency should be increased to four times a day.

A horse should not be watered for at least an hour after feeding but may be allowed to drink freely while at work and even though it is sweating. If the horse is brought in hot, it may be watered immediately but should be kept moving until it cools down. The animal should be allowed ample time to drink its fill and not be led away the first time it raises its head from the water.

Watering troughs should be sufficiently high so that restless animals may not paw over the rim. Neither should the troughs have any sharp angles or corners.

CAMELS

The camel has an extraordinary endurance to go without water for long intervals though the extent of this power is sometimes rather exaggerated. He can abstain from water for many days on a single occasion, but cannot keep on working on a short water supply without breaking down. The degree of endurance to thirst varies with the breed, but a camel brought up under conditions where water is available at short intervals will not be able to stand the thirst to any large extent. However, he can be trained to withstand longer intervals between drinks than he has been used to, but unless an emergency demands it, it is not advisable to do so. The quantity of water needed per day by a camel will depend upon the nature of work and food. In our country, camels are watered

once a day in the cold weather and twice in the hot weather. In the desert areas of Rajasthan camel herds often go two or three days between drinks, but the *bhoosa*-fed camel of Bikaner is watered daily. In the cold weather, the camel should be given water at midday, while in the hot weather it should get water both in the morning and evening.

A drink given when the camel is hot after work is liable to cause disorders. It is important to note that in areas infested with the biting-fly, the camel should not be brought to a pool but be watered from a pail.

Camels usually prefer slow flowing water to the running stream and will prefer stagnant and muddy water to clean and fresh water if they are accustomed to it.

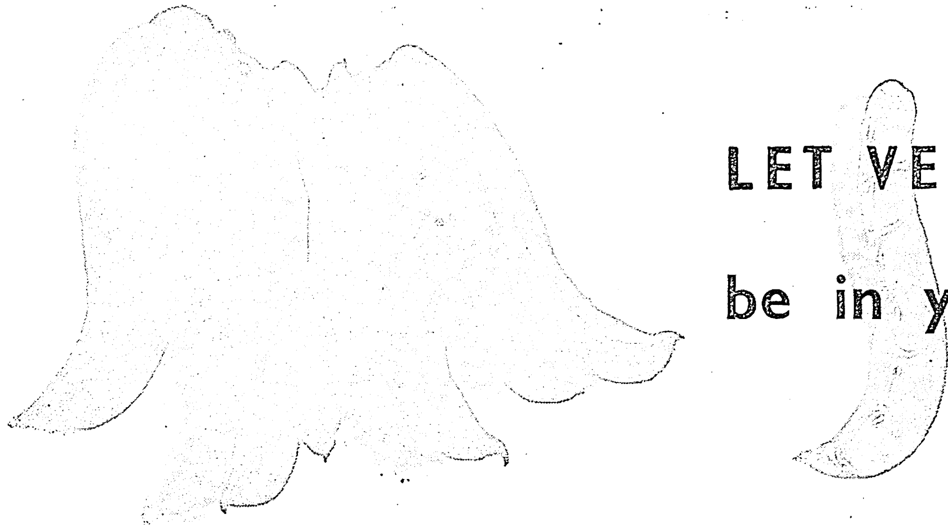
A camel consumes three to eight gallons of water per day, though of course this figure will vary under different conditions of living. After a long abstinence from water, a camel may drink over 20 gallons at a stretch. A very thirsty camel may die of over-distension after a long drink. Patience should be shown in watering the animal, as it takes its own time at it and does not drink its fill at once.

SHEEP AND GOATS

Sheep and goats are purely grazing animals and their daily water requirements will depend upon the season and the amount of water in the feed. Sheep on green grass and in winter will require a very much smaller quantity of water than when on dry feeds or during summer months. On an average, sheep and goats need $\frac{1}{4}$th to $\frac{1}{2}$ gallon of water per day. Goats in milk need more, depending on the milk yield. Experience shows that three waterings during summer and two during winter from the troughs are enough to keep them healthy. Apart from this, water should also be available in the pens at all times in small earthen troughs which keep the water cool during the hot summer months.

PIGS

Like all other classes of livestock, the pigs should always be supplied with plenty of water. The quantity of water consumed by pigs ranges from 4 to 12 lb. daily per 100 lb. body-weight. The frequency of watering should be twice daily from the trough or the pail. If pigs get plenty of water through watery feeds, such as dairy by-products, there may not be any need for providing them with water separately.



LET VELVET BEANS be in your rotation

by

SARDAR SINGH

VELVET BEANS, *Stizolobium deeringianum*, are going to play an important role as a rotation crop in Indian crop husbandry, particularly where mixed farming is practised, judged by the experience with the crop at the Institute of Plant Industry, Indore.

The Bean, besides being a good green manuring crop, forms a nutritious forage for livestock. By virtue of the cover it gives, it protects the soil against erosion and does not permit weed growth.

The Velvet Bean is comparatively new to Indian agriculture, unlike the other members of the bean family. Some believe, however, that it is a native of India, from where it was introduced to Western countries about a century ago, and where it has come to be known as an important field crop.

Feeding tests at the Institute's Farm have shown that the Velvet Bean is a nutritious and palatable feed both for milch and draft cattle. The hay contains from 14 to 16 per cent protein, while the kernel has as much as 21 to 26 per cent of it. In addition, it contains about five to six per cent of fat. This feed can, therefore, possibly replace costlier feeds such as cotton-seed and wheat bran. An expert at the Florida Research Station (U.S.A.) maintains that a ton and a half of velvet beans is equivalent to a ton of cotton-seed in feeding value.

The plant grows quick enough to cover the field thick and suppress other vegetation, including weeds of all kinds, like *kans*. The canopy formed by the plant prevents erosion, and acts as a filter to retain the fine soil particles during heavy downpours.

EASILY CULTIVATED

Even when Velvet Beans are grown for the kernel, their extensive root system can provide a liberal supply of organic matter to the soil to enrich it. As a green manure, its tender leaves and shoots get easily decomposed, and the crop can add 80 to 100 lb. of nitrogen to the soil.

Another advantage the Velvet Bean offers is easy cultivation. Seeds being quite bold and viable, a fine seed-bed is not needed for sowing the crop. It will germinate even in a cloddy field. Hence, two ploughings or *bakharings* are enough preparation for a seed-bed for the Bean.

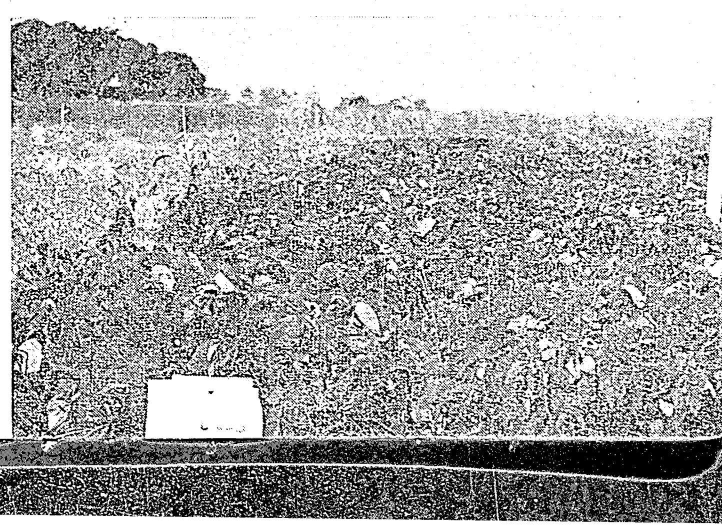
For grain, the sowing is in lines four feet apart behind the plough. Otherwise, the crop is broadcast and the seed mixed with the soil. Thirty to forty pounds of seed will give a uniform stand. In areas depending upon natural precipitation, the crop can be sown as a *kharif* crop with first showers.

Though the Bean is not as judiciously manured as other crops, it responds well to application of phosphatic fertilizers drilled at the time of sowing. No interculture is needed, as the vines grow 15 to 20 ft. long covering up the ground with their profuse foliage.

For forage, the Bean is harvested about 90 or 100 days after sowing, giving a per-acre yield of 100 to 200 md. of green fodder. For grain, it is ready for harvest in six month's time, when the pods are completely matured, as seen by the dark colour, hardness and curving of the pods.

The pods are generally picked and threshed. The yield per acre varies from 8 to 12 md. of kernel and 30 to 40 md. of dry hay.

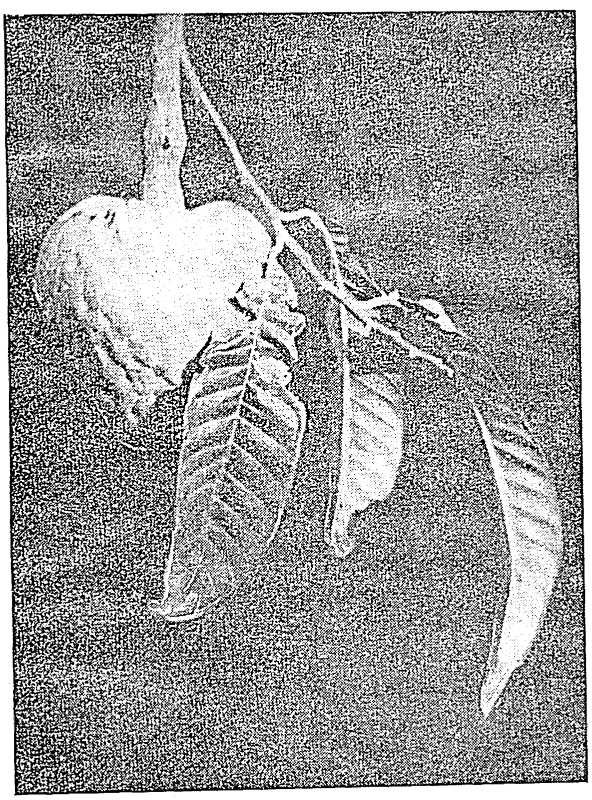
Weeds are completely smothered because of the vigorous growth of Velvet Beans



Your orchard won't be complete without a couple of *ramphals* in it

RAMPHAL *is a good fruit*

by
B. L. CHOUDHRY



SOME people fancy *ramphal* (*Annona reticulata*), though they grow it in twos and threes and not on an orchard scale.

The fruit is of the same family as *sitaphal* (Custard-apple or *A. squamosa*) which is one of our sweetest fruits. Ramphal is also called the bullock's heart because of its appearance. It is distinguished from *sitaphal* or custard-apple and *hanumanphal* or cherimoya because of its long narrow leaves and the solid compact fruit. The fruit is red-spotted and has a creamy or custard-like pulp. However, it is inferior to both the other fruits in taste, and some varieties distinguish themselves by being even insipid.

The unripe *ramphal* is considered an anthelmentic, its bark a powerful astringent and leaves and seeds insecticidal. The pulp prepared from *ramphal* (or *sitaphal*) seeds has insecticidal properties, and when applied to the head as a paste and allowed to remain for about half an hour and then washed off clean, is effective in killing head lice.

The plant can be successfully grown anywhere in the country up to an elevation of 2,000 ft. It has no preference to any particular soil, but a medium heavy, well-drained soil gives the best results. The plant grows to a height of 20 to 25 ft.

Ramphal is a hardy plant and is raised from seeds. Special varieties can be propagated by shield or cleft grafting. Seeds can be sown in May-June. It is best to raise seedlings in pots as only a few plants are generally planted in orchards. The pots should be filled with one part of sand, one of leaf mould and one of garden soil. Two to three seeds are sown in each pot and kept in semi-shade and watered regularly. Seedlings so raised are easy to transplant and can be tossed out of the pot without damaging the roots.

METHOD OF CULTIVATION

Seeds can also be sown in the field itself. Pits for planting, measuring 2 ft. × 2 ft. × 2 ft. should be dug in May and filled with equal amounts of rich garden soil, cowdung or compost manure and sand. The spacing should be 22 to 25 ft. between two pits. In each pit, two to three seeds should be sown and when the seedlings are six to nine inches high, the best among them retained and the others removed. *Neem* oil-cake at the rate of one seer a pit may be added in preparing the pit if white ant attack is feared.

Ramphal requires to be cared for well till it establishes itself. It is easily affected by cold and frost and hence requires to be protected from these during the winter. A thatched roof with an opening on the eastern side put up over the plant will provide it with enough warmth during the cold season. Irrigation is not required during the rainy season unless there is a long break in the monsoon, but it is good to fork round the plant and apply oilcake powder at two seers a plant, depending on the size and growth of the plant.

During the winter, a profuse irrigation once a fortnight, and during the summer, once a week or once in five or six days, will be required. In subsequent years, the irrigation interval should be increased so that

(*Continued on page 21*)

GRADED EGGS CAN RAISE YOUR PROFIT MARGIN

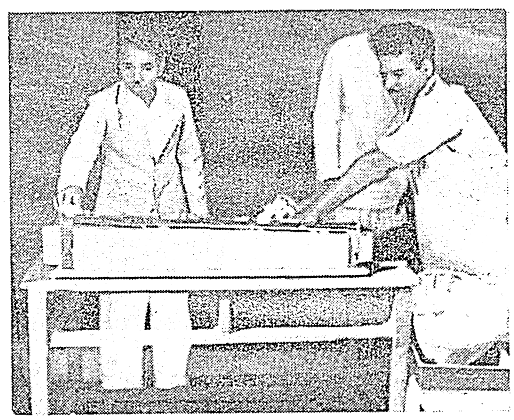
One problem of marketing that needs equal consideration from the egg-seller as well as the consumer

by
H. S. Bawa

MORE egg-dealers are going in for Agmark grading of their eggs today than they did in 1948. In 1953, over 97,00,000 eggs worth over Rs. 10,46,000 were graded by the dealers as against about 36,76,000 eggs worth about Rs. 420,000 in 1948.

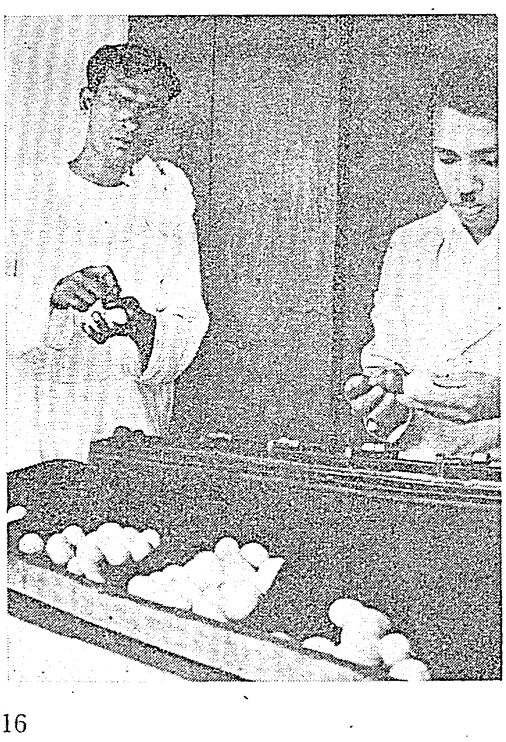
Grading by the Agmark standards is becoming more popular because it means more money for the seller and the money's worth for the buyer.

Egg-dealers, who can satisfy the conditions laid down by the Directorate of Marketing and Inspection under the Agricultural Produce (Grading and Marketing) Act of 1937 get certificates of authorisation for grading their eggs and marking them with the Agmark stamps showing the various grades.



This is how eggs are machine-graded at the Mysore Station

Agmark seal being put on graded eggs at the Mysore Egg Grading Station



Grading is done, as per standards laid down, according to the internal quality and weight of the eggs. Hen and duck eggs are graded under Agmark into four grades: 'Special', 'A', 'B' and 'C'. The minimum weight prescribed for each of these grades is 2 oz., $1\frac{3}{4}$ oz., $1\frac{1}{2}$ oz. and one ounce for hen's eggs and $2\frac{1}{2}$ oz., 2 oz., $1\frac{3}{4}$ oz. and $1\frac{1}{2}$ oz. for duck's eggs. Specifications for the internal quality for all grades are, however, the same.

Apart from grading, eggs should reach the consumer in a good and edible condition, and the huge waste occurring due to deterioration and spoilage eliminated or reduced if full benefits are to be obtained. This means the eggs must be intelligently handled from the time they are laid till they reach the consumer's table, and the entire marketing process speeded up.

CLEANING AND CANDLING

Under Agmark, all eggs are cleaned and candled before grading. Dirty eggs deteriorate sooner in quality than the cleaned ones, as the bacteria get into the eggs through the pores. If washed, the water helps carry the bacteria through the shell, resulting in mould

formation. Eggs are generally cleaned by steel wool or emery-cloth, but a cheap alternative generally adopted are pieces of *baan* or *munj*. Very dirty eggs are by warm water at about 100°F.

Quality is determined by four primary factors: condition of the shell, size and condition of the air cell, condition of the yolk and condition of the white. All these excepting the shell being inside the egg, their condition is determined commercially by a process known as candling.

Candling consists of holding the egg before a suitable light, usually artificial, in such a way that the rays of light penetrate the egg to a great extent, making it possible to observe the condition and behaviour of the contents.

GRADING IN MYSORE

Grading of eggs under Agmark not being compulsory, only a small percentage of eggs produced in our country is graded. Taking into consideration the perishable nature of the eggs and the safeguarding of the consumers' interest, making grading compulsory, as has been done by the Municipality in Mysore city, may be found highly beneficial.

The compulsory grading of eggs in Mysore city under Agmark was started in October 1947, under Section 51(1) of the Municipal Act of 1933.

The Municipality collects from the sellers a small fee of three annas per hundred eggs for grading. All eggs are brought to the Grading Station before sale. Each graded egg is marked by an Agmark grade. The inspection staff visits the shops to see that no ungraded eggs are sold.

The expenses of the Egg Grading Station are met from the collection of grading fees. Such a scheme with suitable modifications can easily be adopted by other municipalities. The staff of the State Marketing Departments periodically pays surprise visits to the graders' permises to check if the grading and marking of eggs under Agmark is done correctly or not.

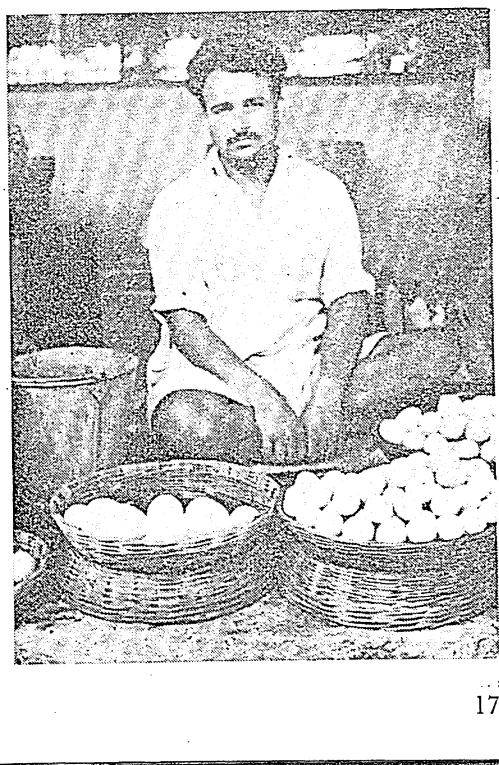
The Madras State Government has fixed the grading charges on eggs and oranges at eight annas for every thousand or part thereof to provide for an efficient inspecting service and to meet the expenses on quality control, and have made it incumbent on holders of certificates of authorisation for grading to pay these charges.

Big scope exists for organising producers' egg marketing co-operative societies in areas of high production, and at such centres the grading of eggs could be introduced with advantage. Graded eggs sell at a premium of five to ten per cent over ungraded eggs.

Eggs being candled at the Station

☆

Graded eggs kept for sale in the Mysore market



impress them with talk and action

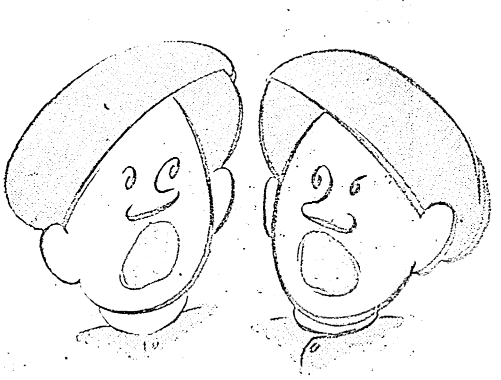
On the way you talk and act depends whether you win over the villager or lose him

IN many cases, the village worker will have to get *individuals* to adopt certain simple improved practices before he can expect to achieve village group action; examples: better feeding of bullocks, using better seed or better sanitation in the home. The best way to do this is by establishing direct contacts with the farmer.

Direct contacts are established with villagers by getting acquainted with individuals or just visiting people and sitting down for discussing village problems, or even just for gossiping. Other direct contacts are made in meetings where you are called upon to talk, or on tours, or in personal visits to demonstrators, and so on. Efforts in every case, however, should be directed towards achieving your goal.

GETTING INTO CONVERSATION

Visiting people and getting into conversation with them is the simplest and most inexpensive way of achieving direct contacts, though it may prove to be time-consuming. To be successful in conversation, take care that you engage people when they want to hear you, and that you allow others to do most of the talking. Be prepared to learn as well as instruct, for when people feel that they are able to contribute to your knowledge, they are more inclined to talk to you.



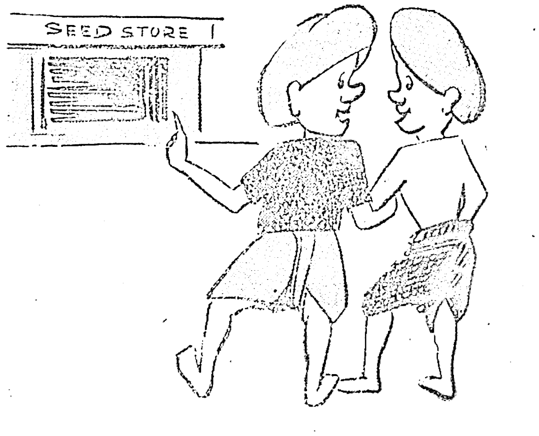
Be accurate in your statements and keep others' interest in view while talking. Don't interrupt when others are speaking, so that you allow the other man to receive credit for good ideas. Don't try to argue, as you are sure to lose friends if you do. Display a cheerful disposition throughout the conversation, using natural and easy language, so that you leave the group or person as a *friend*.

MAKING FRIENDS

Sometimes, you may have to develop actual friendship with the farmer whom you want to adopt a new practice, say, using better seed. The first step in that direction would be to get acquainted with him and then gradually develop this acquaintance into a friendship.

Then you could introduce the subject you want to get your friend interested in in the course of a friendly talk, getting your friend's ideas while expressing your own side by side. Show him photographs, if possible, and give him literature also if he happens to be literate. Take him to a demonstration showing what improved seeds will do, if one is available, even if you have to go to a neighbouring village for it.

When your friend has accepted your viewpoint, and is ready to give a trial to your suggestion, don't think that your job is over. You have to help him find the source of such seed and lead him to make the actual purchase. Also help him decide exactly when and how the seed should be sown, and keep in constant



touch with him to give all the additional assistance he needs.

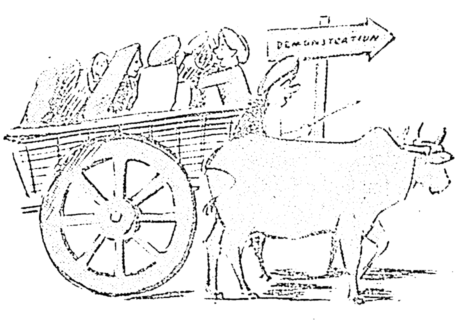
Before undertaking this task, however, make sure that you yourself are certain about every step in the production of a crop by the use of improved seed. If you have any doubt, remove it by consulting reliable experts or references, for your future depends on giving the *right* guidance.

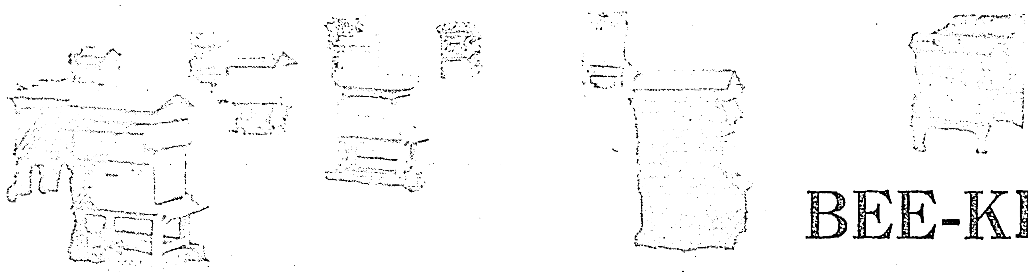
TOURS

Tours, like any other teaching aid, must also have a definite purpose, such as seeing the result of a new practice, seeing a new practice demonstrated, seeing the operation of a new implement or tool, or seeing what other villages have accomplished, such as co-operative sanitation.

Tours should be *planned*. They must help people recognise the problem, create interest among them, generate discussion and provoke action. Before going on a tour, make sure what you are going to show or teach, what tools, etc., will be necessary, who will go on the tour, date and time of the tour, whether drinking water, shade and other conveniences are prepared, what transportation is needed and what refreshments are to be served.

These arrangements complete, you must notify villagers of the decisions. A tour may be called successful if everyone could see and hear you, if time for questions and answers was given, if village people participated, if there were no accidents and if the people did not get tired of you.—*From the forthcoming publication " Extension Guide for the Village Worker"*





BEE-KEEPING IS THE SWEETEST HOBBY YET

An art simple enough for the smallest fellow in the family to learn

by
R. N. Muttoo

THE honey bee, known to man since the earliest times, produces honey, a food of high nutritive and medicinal value. It also produces bees-wax, which finds many uses in industry.

But what is not so well-known about the honey bee is that it also helps pollinate a great number of our crops, thus leading to increased crop-yields. Several varieties of fruits, legumes, oilseeds and cucurbitaceous vegetables benefit from this activity of the bee. Scientists today hold the view that the service that the bee renders to the human race lies not so much in the production of honey as in pollinating and thereby increasing the production of field, vegetable and fruit crops.

The art of keeping bees in a rational way, employing them with profit to the keeper is bee-keeping.

The old method of honey production is cruel, unhygienic and uneconomic. It consists of periodically destroying the bees and their nests and squeezing out the honey out of the combs. The combs not only contain honey but also pollen and larvae, and when crushed, these get mixed with the honey along with the dirt and sweat of the hands. Such an extraction, apart from resulting in the production of honey which is unhygienic also results in the destruction of the bees and their combs.

By following the modern method of bee-keeping, however, not even a single bee or a comb need be destroyed. Honey can be extracted with the help of a simple machine, and untouched by hand. This makes it possible to use the same bees for producing honey season after season and for an indefinite period.

The honey bee does not possess what we call intelligence, but works by instinct. It cannot be tamed as we tame and keep a dog, a cat or a cow. A study of their habits and behaviour, therefore, will help in getting the maximum advantage out of them.

A SIMPLE ART

Bee-keeping on a small scale does not involve much of capital. Initially, the only expenditure needed is for the purchase of hives and other tools. Thereafter, only a small expenditure is needed for maintaining the hives.

Anyone, old or young, can keep bees with profit. The labour involved in bee-keeping being light, it can be a highly suitable occupation for women and children.

Bee-keeping can be made one's sole source of income, but it is best taken up on a small scale as a cottage industry to attend to in one's spare time, and either to provide honey for one's own use or get a supplementary income out of it by sale.

Anybody can keep from 2 to 20 hives without any strain on one's capital, resources, space, labour or time.

In bee-keeping, bees are the labourers. The bee-keeper's labour consists of a few intelligent manipulations, three or four times a month. Even a score of hives will not take more than half a day's time of the bee-keeper in a week.

Bees can be kept at any place where there is sufficient bee pasture of shrubs, fruit, orchards and cultivated crops. They can not only be kept in rural areas, but also in big cities. The popular notion that they do not thrive in the hills is not correct.

Bee-keeping does not require any land. Bee-hives can be kept in one's courtyard, in the verandah of the house or even on the roof.

NECTAR

The raw material required for honey production is the sweet juice produced by flowers called nectar. While all flowers do not produce nectar, among those which do, some secrete more and some less. Those that produce a large quantity of nectar are the ones most useful for honey production. Here are a few which produce good nectar: apples, pears, apricots, plums, guavas, citrus, *jaman* (*Eugenia* sp.), plantain, *loquats* and persimmon among fruits; *sarson* (*Brassica* sp.), legumes, buckwheat, cotton and coffee among field crops; *tun* (*Cedrela toona*), *shisham* (*Dalbergia sissoo*), *semal* (*Bombax malabaricum*), soapnut, wild cherry, tamarind, eucalyptus, *sal* (*Shorea robusta*), bottle brush, horse chestnut and Indian elm among forest trees; beans, cucurbitaceous plants, lady's finger and radish among vegetables. Some weeds and wild shrubs also provide nectar to the bees.

Bees form a beard

Besides nectar, flowers also produce pollen which forms a nitrogenous food for the bees mostly for feeding young ones in the larval stage. Some flowers secrete nectar and also provide pollen. There are others which provide only pollen. The number of such trees is very great.

There is no difficulty about finding a market for honey. The demand is already great in the country.

Bee-keeping can be a very pleasant and fascinating pastime and has an excellent educational value both for the young and the old.

(*Continued from page 15*)

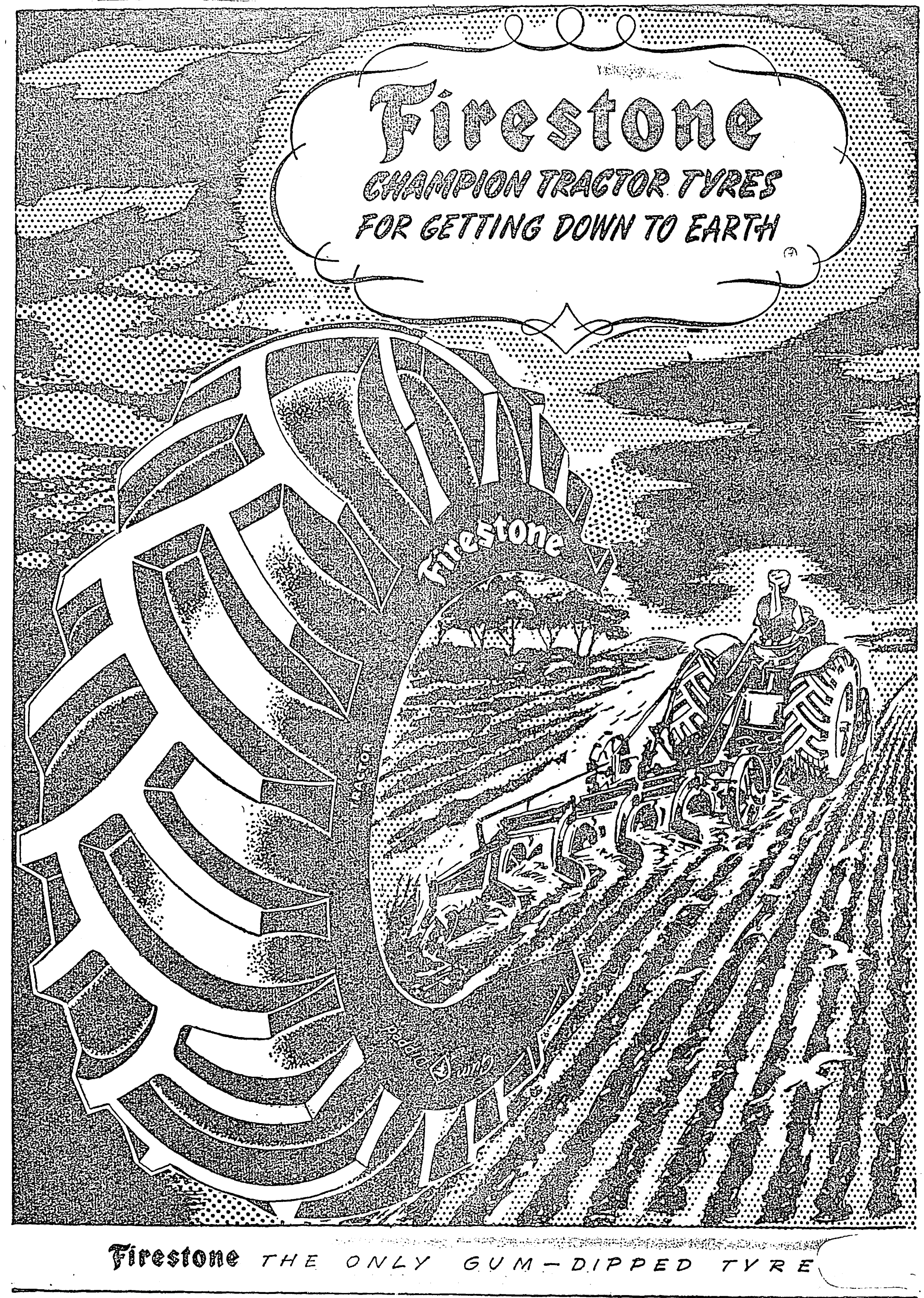
when the tree is full-grown and bearing, it receives one irrigation a month in winter and one a fortnight in the summer.

The tree grows up into a graceful form and will not require any pruning, but if it shows a tendency to put on more vegetative growth at the expense of fruiting, a mild root pruning may be given.

The tree starts fruiting in about four to five years and is a shy bearer. A full-grown and well-bearing tree produces a maximum of 75 to 100 lb. of fruits. This is a handicap in commercial fruit production and stands in the way of the fruit being grown on a large scale.

There are no standard varieties of *ramphal*. The Agri-Horticultural Society of India has a strain called *Society's Hybrid*, which has a superior fruit quality, being less sandy than the local types. An excellent fruit-yielding plant (variety not known) is seen growing in the students' garden of the Hindustani Talimi Sangh, Sevagram.

Ramphal will serve as a novelty in any homestead garden of a pretty good size.


Firestone
CHAMPION TRACTOR TYRES
FOR GETTING DOWN TO EARTH
Firestone
TRACTOR
Firestone THE ONLY GUM-DIPPED TYRE
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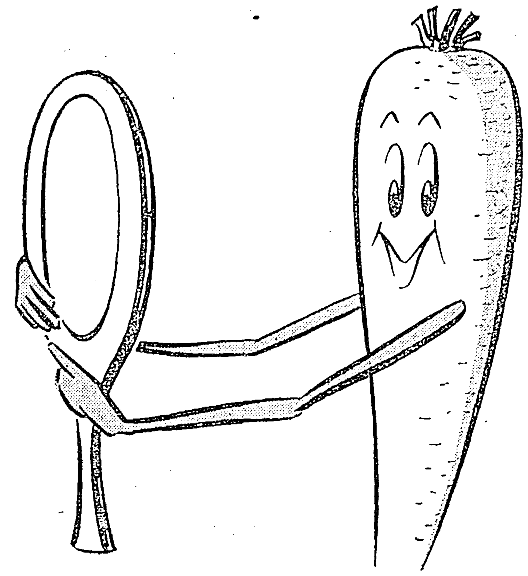

PREPARE YOUR VEGETABLE EXHIBITS

WHEN next you exhibit your vegetables at any show or exhibition, besides uniformity in shape and colour of your produce, remember that there is another factor that counts—your exhibits must bear a presentable look, or, as you would call it, have a proper 'finish'. Here is what you should do.

In case the exhibition is being held during the season of full growth, exhibit your carrots and beet root with their full complement of foliage, if good. Any damaged or withered leaves should be cut-out neatly and carefully.

The leaf-stalks of beet root, however, should not be cut, but twisted off gently, fairly close to the crown. This will avoid bleeding. To give the beet root a tidy look, neatly char the severed ends over a candle flame or a lighted taper.

If you are one of those who store these roots in sand, use soft sand for the purpose. When you lift them out, gently remove any particles of sand adhering to them with a piece of soft flannel slightly moistened with olive oil; but don't use too much oil.

You may have to carry vegetables sometimes when the show is held quite a distance from your garden. Then select a receptacle big enough to hold your exhibits without having to crowd them in. Pad its bottom properly and place pieces of clean tissue paper over the padding, taking care that all the sides and ends are also well-covered with paper.

If you want to exhibit perfect specimens of vegetables, pay attention to the main factors: procurement of high quality seeds of the best variety, intensive cultivation and judicious manuring. Personal care and supervision of the crop are also very essential.

No doubt, these considerations far exceed the essential demands of utility and involve a complete disregard for economy. But then, exhibits are exhibits.

FARM BULLETINS

To meet the paucity of literature in a simple, yet authoritative form, the Indian Council of Agricultural Research has planned a series of bulletins dealing with farming and animal husbandry subjects. Each of the Bulletins is so written as to give a general picture of farming practices in vogue in the country, and suggest improvements based on research results. The Bulletins will be found useful by the farmer, the agricultural student and the Extension worker alike.

Farm Bulletin No. 1. Rice Cultivation in India (*Price As. 4*)

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- Goat-keeping for Profit
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- Sugarcane Cultivation in South India
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- Bee-keeping in India
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- Poultry-keeping in India
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If you like to be kept informed of these publications as and when they are out, please write to:

The Secretary,
Indian Council of Agricultural Research,
Jamnagar House, Mansingh Road, New Delhi-2

NEW BOOKS RECEIVED

Weeds in Indian Agriculture

By Chandrika Thakur; published by Motilal Banarsidass, Publishers & Booksellers, Bankipur, Patna; first edition, 1954, pp. XV+125 with 53 plates; price Rs. 7-8.

A treatise on 106 weeds commonly found in the plains of northern India.

Special Independence Day Number of the "Bulletin" issued by the Indian Central Coconut Committee, Ernakulam

(Annual subscription Annas 6, single copy Anna one only)

Rural Progress Through Co-operatives

Published by the United Nations Department of Economic Affairs, New York; pp. VI+112; price $ 0.75; available in India from Oxford Book & Stationery Co., Scindia House, New Delhi, also, 17, Park Street, Calcutta, *and* P. Varadachary & Co., 8, Linghi Chetty Street, Madras 1.

The Economic Weekly

A Journal of current economic and political affairs published by the Asian New Age Publishers Ltd., Noble Chambers, Parsee Bazar Street, Bombay 1.

Statistical Statements relating to the Co-operative Movement in India, for the year 1951-52

Published by the Agricultural Credit Department, Reserve Bank of India, Bombay; pp. A to I+101; price Rs. 3.

GREEN PEAS

by

H.B. Singh and S.M. Sikka

With this new knowledge on green peas you should be able to pick more basketfuls of them at the next harvest

GREEN PEAS occupy an important place among the winter vegetables grown in India. They are not only rich in proteins, but also serve as as excellent source of vitamins, phosphorus and iron.

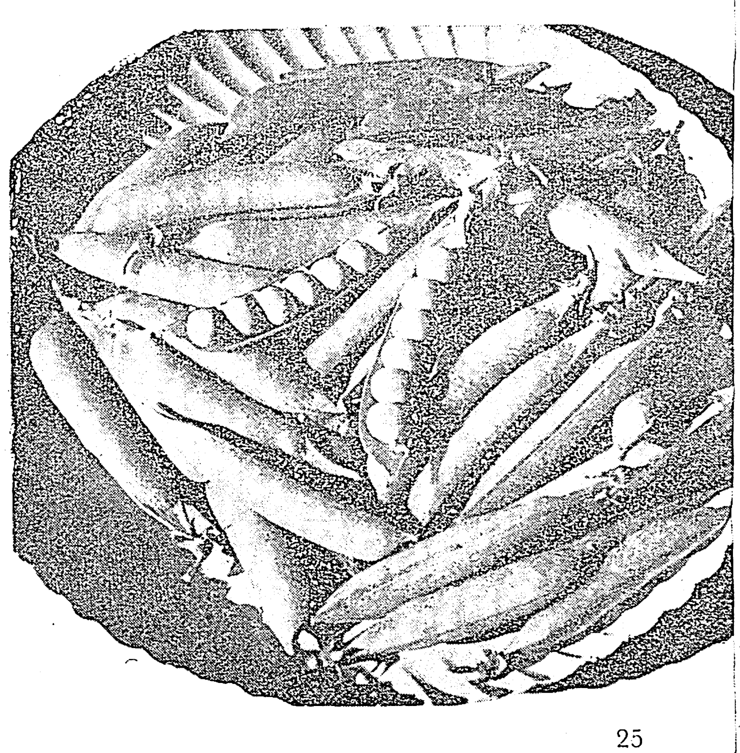
Green peas are grown on a commercial scale chiefly in the Punjab, Delhi, Pepsu, Uttar Pradesh and Himachal Pradesh, and to some extent in Bihar, West Bengal, Orissa, Madhya Pradesh and Bombay. In the plains of northern India, the cultivators of Lucknow and Meerut in Uttar Pradesh and Ambala, Hoshiarpur, Attari and Amritsar in the Punjab have specialized in the cultivation and marketing of peas. In the north Indian hills, both summer and autumn crops are raised and a part of the produce is marketed down to the plains from April to November.

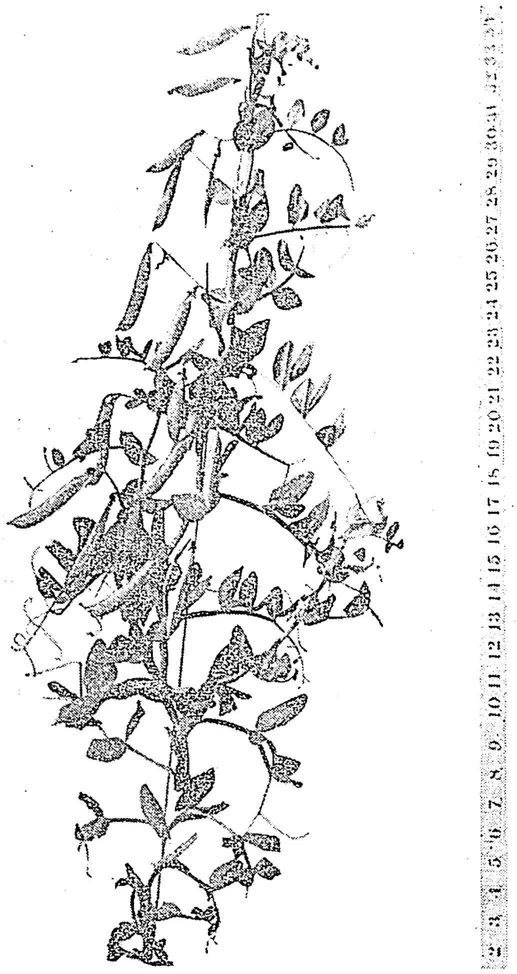
A large number of varieties of the garden pea are listed by the Indian seedsmen, but so far as the varieties under commercial cultivation are concerned, it may be said that there are not very many. The growers in the Punjab cultivate the green-seeded *Hara Bauna*, also known as *China* and the white-seeded *Desi Bauna*, also called *Lucknow Boniya*, for the early crop, and the mid-season medium tall varieties *Farshi* and *Do Futta* or *Kirpan* for the main crop. The latter mid-season variety is in fact the English canning variety *Lincoln* or *Greenfeast*. Both *Farshi* and *Do Futta* are wrinkle-seeded, but whereas the former is double-podded, the latter bears pods mostly singly. In Ambala, a fine crop of non-irrigated peas called *Kali Nagini* or *Simla* is grown. It is a white-seeded variety with a black eye (hilum). This is also the variety grown in Himachal Pradesh. In Ambala is also grown *Desi Bauna*. In Meerut, *Desi Bauna* and *Darantia Kaip* (actually, the *Do Futta* or *Kirpan* of Amritsar) are grown on an extensive scale. A somewhat taller growing wrinkle-seeded variety named *Khaparkheda* is popular in some parts of Madhya Pradesh due to its sweetness. The green pods of the grain type of pea commonly grown in Delhi and western Uttar Pradesh mainly as a non-irrigated crop in the *sailab* lands, are also used for culinary purposes.

As a result of careful studies made at the Indian Agricultural Reserch Institute, New Delhi, the Institute is now in a position to recommend some really fine improved pea varieties for raising early and main season crops. The varieties which have been selected from a large collection of foreign types imported from abroad and collected from seedsmen, State Departments of Agriculture and cultivators in India are: *Asauji*, *Early Badger*, *Delwiche Commando*, *Bonneville* and *N.P.* 29.

'Asauji': This variety is a selection from the local mixed sorts of *Hara Bauna* or *China*, and has been specially selected for sowing the early crop about the middle of

This is 'Bonneville'. The variety produces well-filled pods which give a high shellout percentage





'Bonneville' is a medium tall variety which fruits prolifically

September. It is a dwarf type growing to a height of about 15 in. The average number of pods borne per plant varies from five to seven. The pods are dark green in colour, curved, about three inches long and well-filled with six to seven peas per pod. The green pods give a shellout percentage of 40. The pods are ready for the first picking in about 60 days. The seeds are mostly round and bluish green in colour.

'Early Badger': This is a foreign variety introduced from America and is especially suitable for sowing in early October when the weather cools down a little. It is a dwarf, wrinkle-seeded variety which gets ready for the first picking in 60 to 65 days after sowing. The pods which are about $2\frac{3}{4}$ in. long are borne mostly singly. Well-filled pods, boldness of seed and sweetness of the green peas are its special merits. It gives a shellout percentage of 40, and about 100 pods are contained in one pound weight.

'Delwiche Commando': This is also an introduced variety from America and is suitable for sowing of the main crop from 15th October to 15th November. The plants are medium tall, bearing generally two pods per peduncle. The pods are about three inches in length and are well-filled. About 130 pods are contained in one pound weight, and the shellout percentage is 45. The green pods are ready for picking in 80 to 85 days after sowing. The seeds are wrinkled.

'Bonneville': This variety too has been introduced from America and differs from *Delwiche Commando* in that it grows a little taller and is more prolific in bearing. The pods are about $3\frac{1}{4}$ in. long which get ready for the first picking in about 85 days after sowing. The shellout percentage of green pods of this variety is high, being 48. About 100 pods weigh one pound. The seeds of this variety are also wrinkled.

The dwarf variety 'Asauji' produces well-filled pods of good length early in the season

'*N.P. 29*': This is another wrinkle-seeded variety which was evolved at the Indian Agricultural Research Institute some years ago. This is a very high-yielding variety but is comparatively late in fruiting, the pods being ready for picking in nearly 100 days after sowing. The green peas are very sweet in taste. Generally, about 125 pods are contained in one pound weight. The shellout percentage of this variety is the highest, being nearly 50.

With a view to realising maximum production from these varieties, it is essential to sow the varieties at a time for which they are especially suitable. It will not generally pay to sow early varieties like *Asauji* and *Early Badger* for a main season crop. As regards sowing of main season varieties, the best results are likely to be achieved when they are sown between 15th October and 15th November, but their sowing can be extended up to 15th December in the farther north.

'N.P.29', a high-yielding double-purpose variety for green peas as well as dry peas

PREPARATION OF LAND

Peas can be grown on a variety of soils, from light sandy loam to clay, though the best results are achieved on well-drained, loose, friable, loamy soils. Whereas the crop can tolerate a certain amount of alkalinity in the soil, it does not do well in acidic soils. The soil should be ploughed to a fine tilth before sowing the crop.

Peas give good results in fertile soils. An application of eight cartloads of well-rotten farmyard manure, 300 lb. of superphosphate and 50 lb. of sulphate of potash at the time of preparing the land for sowing, is recommended. Efforts should be made to drill the mixture of fertilizers deep into the soil, near the root zone, in preference to surface application. The crop should be fertilized with about 100 lb. of ammonium sulphate during its growth period by applying the fertilizers in two doses, one in the early growth period and the other at the flowering stage.

SOWING

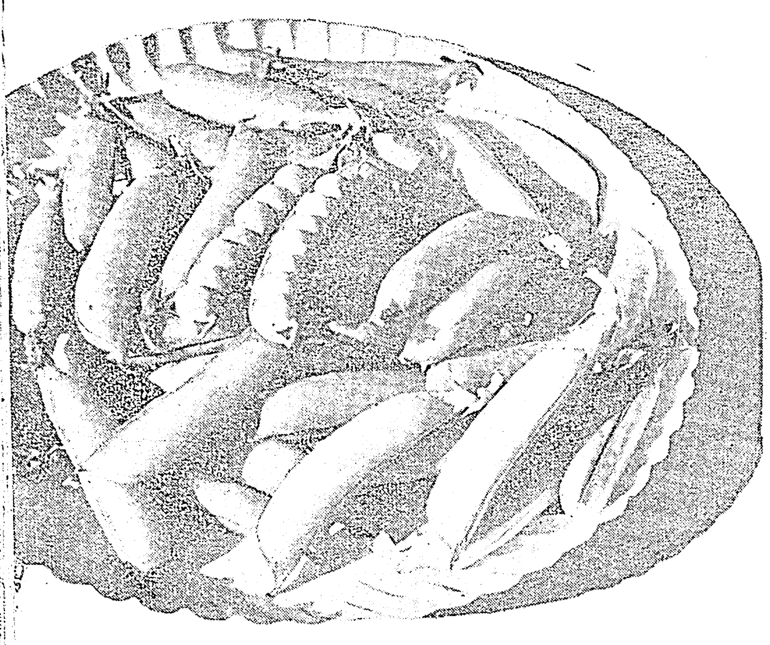
The pea crop can be sown on flat as well as raised beds. The latter method is to be preferred for effecting economy in irrigation water. The width of raised beds should be adjusted in accordance with the time of sowing and the variety. For varieties like *Asauji* and *Early Badger* sown early in the season, the raised beds should be two feet wide, whereas in the case of the varieties suitable for raising the main crop (i.e., from 15th October onwards) this width can be increased to three feet. The seeds should be planted on both sides of the beds at a distance of one inch to one and a half inches in the case of the early varieties and two to two and a half inches in the case of the main season varieties. In the crop sown on flat beds, the distance between the furrows should be one foot in the case of the early varieties and one and a half feet for the main season varieties. While sowing the crop, care should be taken not to sow the seeds too deep. Generally, a depth of one and a half to two inches is considered adequate for this crop with a view to obtaining best germination.

Amongst the early varieties, 70 lb. seed for small-seeded varieties like *Asauji* and 80 lb. for the bold-seeded varieties such as *Early Badger* would be adequate to sow an acre. In the case of the main season varieties which are sown more widely-spaced, however, the quantity of seed for one acre would be 55 to 60 lb. only. In all varieties characterised by wrinkled seeds, the seed should preferably be soaked in water overnight before sowing to hasten germination and to ensure a uniform stand of the crop. On a kitchen garden scale, a 100 ft. row can be sown with about one pound of seed.

It would be advantageous to make periodical sowings of the crop at 10 to 15-day intervals to prolong the harvesting period of green pods and also to facilitate the picking of pods.

AFTER-CARE

The September-sown crop sometimes gets the advantage of the late showers. During the dry period



Boldness and sweetness of green peas are the chief characteristics of 'Early Badger'

after the rains, irrigation is required once in 8 to 10 days till the weather cools down sufficiently, after which the plots can be irrigated once in 20 days or so. The main season crop, if sown after irrigation, would need one or two irrigations in the pre-flowering stage and two irrigations during the fruiting period. The crop should not be starved of water when the young pods are developing. Adequate irrigation during the frosty weather is also essential for saving the developing flowers and pods from frost damage. Hoeing should be done two or three times in the early growth period ; this operation mulches the surface, thus helping to conserve moisture. In the later stages of growth, occasional weeding will suffice.

HARVESTING THE CROP

The green pods are hand-picked in this country. A good number of pickers are therefore necessary. A good picker should ordinarily harvest 300 lb. or more pods per day; three to four pickers are thus required for picking the crop from one acre. Some growers prefer a continuous harvesting season while others prefer to have the entire field picked in one or two days and then stop until the field is ready for another picking several days later. The plants should be handled gently during picking to extend the fruiting period, as, if the haulms (vines) are damaged during pickings, the remaining pods will not develop properly.

The per-acre yield of green pods varies with the variety, time of sowing and fertility of the soil. The varieties grown early in the season yield less, generally 30 to 40 md. per acre. The second early varieties like *Early Badger* which are to be sown in early October are capable of yielding up to 75 md. while the mid-season or main season varieties yield more, the average yield being 100 to 125 md. per acre. In small plot trials (100 sq. ft.), a good crop of *Early Badger* gave a yield of 7,845 lb. (96 md.) per acre, the corresponding yield of *Delwiche Commando* being 13,525 lb. (165 md.). In both these varieties, there were eight pickings spread over a period of 45 days.

SEED PRODUCTION

Pea is normally a self-fertilized crop, and as such it is easy to maintain the purity of the varieties. It may, however, be pointed out that the pea plant has generally been observed to be unstable; it throws out off-type plants, in some cases rather frequently. If such rogue plants are not removed from the seed crop, considerable admixture may result in course of time. It is, therefore, desirable that the seed crop be examined at the flowering time and also at the maturity stage, and finally, the seeds also examined to detect the presence of any off-type seeds.

The yield of seed, like the yield of pods, also varies with the variety. Early short duration varieties like *Early Badger* yield, on an average, 600 to 700 lb. per acre, whereas the mid-season varieties such as *Delwiche Commando* and *Bonneville*, and late verieties like *N.P. 29*, yield 1,600 to 2,000 lb. The seeds, if properly stored, can remain viable for about three years.

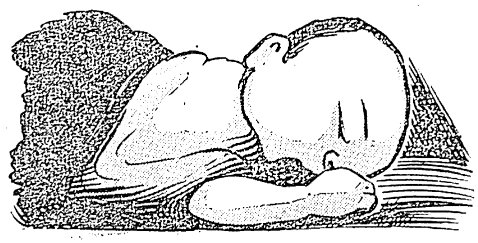
PESTS AND DISEASES

Amongst the insect pests, the pea aphid makes its appearance when the weather starts warming up. The extent of the damage caused by aphids depends on their number which sometimes increases rapidly. Frequent applications of nicotine, either in spray or dust form, or spraying with soap solution (one pound in six gallons) will control this pest. The grubs of the pea moth feed inside the pods causing damage to the developing peas, thus spoiling the contents of the pods. Spraying with ½ to ¼ per cent D.D.T. emulsion at 120 to 140 gallons per acre controls the pest.

Amongst the fungus diseases, mildew (white deposit on the leaves) appears late in the season. One or two applications of finely powdered sulphur will help to keep it in check.

Mice and birds damage the pea crop badly. Mice destroy the seeds before germination and birds pick out seeds from the developing pods. The crop needs to be protected from them to yield well. In kitchen gardens, it may be possible to give a cover of wire-gauze to the pea plot to save it from bird damage.

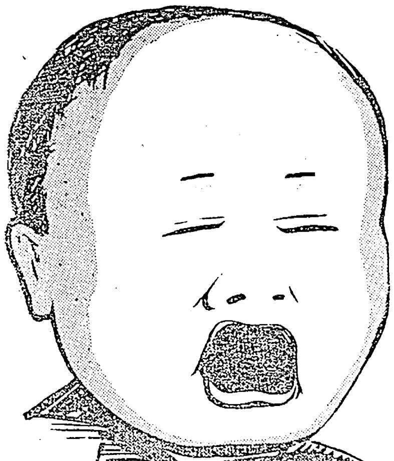
Grandma's advice—is it right ?



any problems with your baby?

MOST young mothers rely on some elderly woman in the house to tell them about how to solve the problems they meet regarding the new baby. No doubt, it is good to have somebody who has the experience to decide things for you, but it may be that the sombody is just wrong in his or her judgment sometimes. Check up below and see for yourself how much wrong old grandmother in the house can be sometimes.

Let us begin with baby's bed. You can make it up with whatever material you have for this purpose, but the surface on which a baby sleeps should be firm and flat so that he can turn his head easily from side to side. A folded blanket will be snug and flat. Don't use the pillow for a mattress because it is too soft. Quilts are not suitable for covering a baby's bed. They are heavy, and do not enclose the warm air from the baby's body as well as blankets do. When tucking the baby, tuck in the blanket that covers the baby under the mattress at the sides but allow enough room so that the baby can move freely. The blanket should not come up close round his neck because you want him to be free to turn his head and get plenty of air.



Baby needs a lot ol sleep. Sleep refreshes and protects him so that he can grow up and develop well. He will sleep peacefully if he gets what he needs to eat and is content and well. With good sleep he will store up energy for his waking time activity. So, build up his sleeping habits well.

SLEEPING HABITS

How much sleep does a baby need? Since one baby is different from another, there cannot be a set answer, but the baby needs as much sleep as he can take.

At the start, his sleep will be irregular. In 24 hours, it may be that he has 18 to 20 periods of sleeping and as many of waking. As he grows up, the sleep periods get longer and as he begins taking larger quantities of food he stays asleep longer.

As he grows up further, he stays asleep longer at a time, and when he is six months old he may be sleeping 12 hours at night and perhaps three to five hours during the day.

How one wishes that the long sleeping periods that he has may come at night but, no, he has his wakeful spells right in the middle of the night. If you have this bother, probably keeping him awake a little while at convenient times during the day or early evening may make him sleepier at night.

How does your baby sleep, on his back or his stomach? Either one is alright and no need to worry. The back of the head of a baby who always sleeps on his back may get a little bit flattened, but that again should not worry you. It will get into shape as soon as he is old enough to sit.

It is perfectly safe for baby to sleep on his stomach if the mattress is firm and flat and he can move his head from side to side easily.

Don't keep the baby restless by keeping him too warmly covered. When you feel his hands or feet, you may find them slightly chilly to the touch, but this does not mean he is cold. The right thing to do would be to feel his body. If that is warm, he is alright. If his neck and chest are damp from perspiration, you can take it that he is too warmly dressed or covered. It is more dangerous for the baby to perspire and get chilled afterwards than feel chill from too few clothes.

FEED AND SLEEP

The baby needs fresh air where he sleeps. But do not put him in a very cold room. To keep away a cold, do not hang anything over the cradle for fear of its falling or being pulled down over his face.

It is good to get the baby on a fairly regular feeding time. Then his sleep will also be at the same hour every night. His night time sleep throughout the first year will be about 12 hours.

Your baby for the first few months will not ordinarily be disturbed by ordinary sounds, but when he is several months old he becomes more aware of what is going on around him and takes note of noises. Hence, try to tone down the household noises if you can when he is going to sleep.

There is nothing wrong if an older baby takes from ten minutes to half an hour to go to sleep either at night or at nap time. It is good not to indulge in exciting play before putting him to bed. He needs to be in a calm mood when he goes to bed. That is why mothers sing lullabies. If the father wants to play with the baby, let him do it when he comes home in the evening and not later, and by no means wake him up from sleep just to show him off when your relatives arrive.

WHEN HE CRIES

New parents are sometimes bothered by the young baby breaking their sleep by crying. This is the only way, you must know, that a baby can call attention to his needs. Every time a baby cries, do not imagine all kinds of things to be wrong with him. Probably it is due to a very mild discomfort he is having and not due to hunger or pain, or maybe, he is not just sleepy and wants your company. Again, it may be that he is tired of lying in one position and just wants you to turn him over. Quite likely, he has wetted his bed.

Prolonged or very frequent crying, however, is not good. That keeps the parents worried. At such times do take him up and soothe him. He is likely to cry far less because of his trust in you.

A crying, if it goes for five to ten minutes several times a day, is nothing to be alarmed about. It is only when there is a lot of crying that you need to get the doctor's advice. If you get in the habit of picking up the baby every time he cries, you may do him more harm than good, because a baby quickly learns to take advantage of his mother's uncertainty. Carrying a baby around a good deal or rocking him too much will only make him stay awake. He will get more tired and his demands will increase. Make the bed-going process a pleasant one and not a hurried one. Elderly people are prone to take a baby's crying seriously even though he may cry very little. In such a case the parent has to be firm and not allow the baby to be picked up.

Never give the baby any kind of medicine prescribed by the people to make him sleep. It will always be safe to consult a doctor when such a necessity arises. Give the baby all the comfort he needs at teething time when he is certain to cry in the night. Some parents put the baby to bed with his bottle beside him. This is a bad practice because he will be so dependent on it that he will not be able to go to sleep without it.

THUMB-SUCKING

Some people worry if the baby begins sucking his thumb or finger and often try to stop it. The baby sucks when he is tired or hungry or does not have anything to watch or to do. There is nothing wrong with the sucking he does. Only when thumb-sucking goes on for years that there is any danger of harm to the jaw or teeth; not otherwise.

The baby may sometimes develop a fondness for holding on to the blanket or toy or some other object for which he gets attached to. The habit is harmless and should not be denied to him.

Next time there is a problem, you know what to do.

READERS WRITE

ON GOATS

The article "This Way to Manage your Goat Flocks," (July 1954) impressed me as it would any other man interested in goat-keeping.

—*S.P.B.*

LUCERNE NO. 9

One of your recent issues contained an account of the brilliant performance of 'Lucerne No. 9.' Could you kindly let us know from where its seed is available?

—*H.S., M.S.*

You may please enquire with the Fodder Botanist, Sirsa, Punjab.

CATCH CROPS

Which of the two 'kharif' catch crops, i.e., 'Mung Krishna-11' and 'Urid Ujjain-4,' mentioned in an article (July 1954) will be particularly suitable for growing on my farm in Malwa?

—*I.M.M.*

For you, '*Urid-Ujjain—4*' is specially recommended for double cropping before wheat or gram. Seed of '*Urid-Ujjain—4*' can be obtained from the Superintendent, Central Farm (Kothi), Ujjain.

—*S.M.W.*

SWEET *DALIA*

I have read the article on *dalia* dish (October 1954) with interest. The *dalia* dish described there is presumably a saltish one. For those who nurture a sweet tooth, I can suggest a sweet *dalia* dish. The method of preparing it is almost the same as that for saltish *dalia*, except for a change in the ingredients used. Prepare sweet *dalia* this way.

After properly roasting the *dalia*, add one cup of sugar and four cups of water to it. Cook it well over a medium fire, but don't let it become too thick. Add a few raisins and copra pieces.

Water can be replaced by milk also to make the dish more palatable and nutritious. If water is used, the *dalia* should be roasted in a little *ghee*.

Before serving, add one or two tablespoonfuls of *malai* on top.

—*S.S.*

MANURING OF SUGARCANE

What chemical manure, and how much of it, will increase sugarcane-yields substantially? Please advise with special reference to a light soil having an average quantity of organic manure.—N.S.

An experiment lasting for 16 years at the Sugar-Cane Research Station, Shahjahanpur, has shown that nitrogen alone is able to evoke a significant response in the matter of cane-yield. The average increase in yield obtained by applying sulphate of ammonia at the rate of 100 lb. nitrogen per acre is 2.5 md. per pound of nitrogen applied. Neither phosphorus nor potassium has shown any effect on cane-yield, when used alone. They merely improve the action of nitrogen.

A manurial dose consisting of 120 lb. nitrogen per acre, of which 90 lb. is to be given in the form of bulky organics (farmyard manure, farm compost, manurial compost, town compost, press mud, etc.) and/or green manures, about 15 to 20 lb., as light organics (oilcakes or steamed hoof and horn) and 10 to 15 lb. as sulphate of ammonia, is recommended. Superphosphate at the rate of 100 lb. phosphoric acid can be included in the manuring schedule of sugarcane with advantage; it should be applied to the preceding green manure or leguminous crop such as berseem, which incidentally, has given the best results.

The results of soil surveys carried out in the sandy loam, loam and clay loam types of Muzafarnagar district in the Western Range of Uttar Pradesh, are given below:

Sandy loam: When using a high dose of nitrogen (e.g., 120 lb. per acre), it would be more useful to apply it in conjunction with 40 lb. phosphoric acid as superphosphate. In this soil type, an average yield-increase of 2.8 md. of stripped cane per pound of nitrogen applied in the form of sulphate of ammonia, can be expected. The best response is obtained with a lower level of application, viz., 60 lb. nitrogen per acre.

Loam: Nitrogen alone was found to be useful and there was no response to phosphatic fertilizer. An average yield-increase of 1.8 to 2.0 md. of cane per pound of nitrogen applied can be expected in this soil type. The best effect was obtained when sulphate of ammonia was applied directly to the crop at the rate of 60 to 120 lb. nitrogen per acre.

Heavy loam: In this soil type, response to nitrogen was found to be the least and of the order of 0.9 md. of cane per pound of nitrogen applied, only. The best results were obtained when the level of application of nitrogenous fertilizer was high, that is, up to 120 lb. nitrogen per acre. Phosphatic fertilizer was found to be ineffective.

In the recent intensive manurial drive started in Uttar Pradesh, Bihar and the Punjab, a topdressing with sulphate of ammonia to the standing crop of sugarcane, at two maunds and one maund per acre to the irrigated and non-irrigated areas, respectively, has been recommended.

—*I.C.S.C.*

MANUFACTURE OF SAGO

I am interested in the manufacture of sago from tapioca. Could you kindly let me know how it is prepared?—T.P.

The manufacturing process of sago consists of the following steps: peeling and washing; grading and sieving; settling and tabling; granulation and formation of sago; gelatinization; drying and polishing; and packing.

Peeling and washing: Tapioca roots are peeled to remove the outer skin and inner rind. The peeled roots are washed in water.

Rasping and sieving: The peeled roots are then fed into a rasper and the rasped material mixed with water and passed over sieves of sufficient fineness (120 to 130 mesh), so as to separate starch from the coarse fibrous material. Complete removal of the fibre is essential for the production of high grade starch.

Settling and tabling of starch: The starch in water is then allowed to settle in settling tanks. The supernatant liquor is drained and the starch that has settled at the bottom again resuspended in fresh water and tabled. The table which is usually made of concreted cement, is about 100 ft. × 20 ft. with channels 12 to 18 in. in width. The fine impurities associated with the starch flow out and the starch (which is usually of a high quality) settles on the table.

Granulation and formation of sago: The starch as obtained from the tables is partially dried till it has a moisture content of 40 to 45 per cent. It is then passed through a granulator where the lumps are broken up into uniform granules. The granules are then transferred to shaking sieves, and shaken for about 20 minutes. Sago globules of various sizes are formed here. They are subsequently passed through the desired mesh (usually 12 per sq. in.) and the bigger ones which do not pass through the mesh are once again granulated and used.

Gelatinization: The globules so made are then transferred to hot aluminium trays coated with a trace of hydrogenated fat and stirred carefully till all the globules are completely gelatinized.

Drying and polishing: The gelatinized sago is then dried in driers at 50 to 55° C in a current of air. It is then passed through a polisher to separate the lumps that form during the earlier processes and to give a bright smooth polish to the grains.

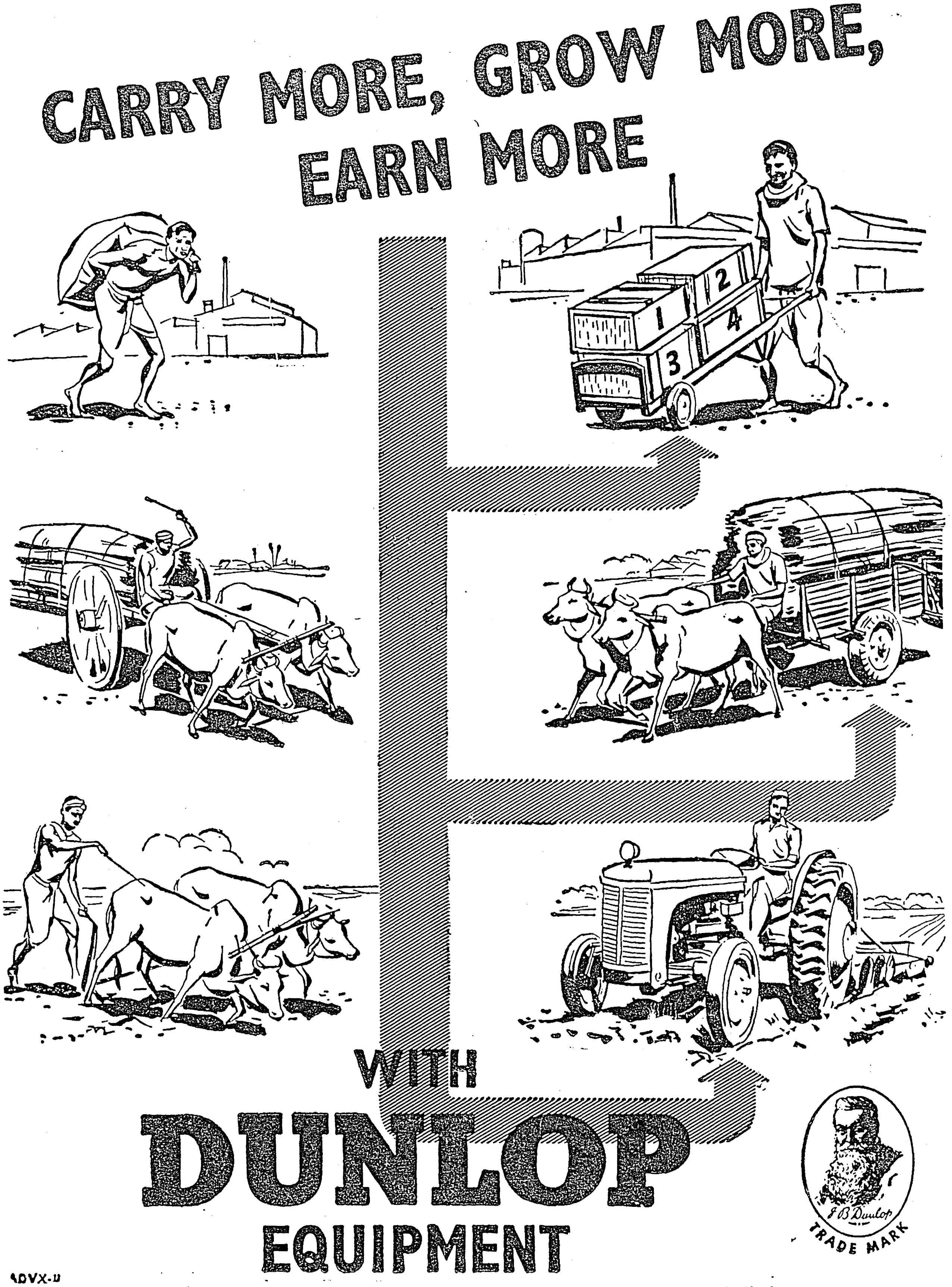
Packing: Sago is then packed in gunny bags. The yield of sago is 22 to 23 per cent of the weight of raw material, i.e., tapioca roots.—*C.F.T.R.I.*

THE EDITOR

INVITES YOUR QUESTIONS & SUGGESTIONS. ADDRESS THEM TO THE EDITOR, "INDIAN FARMING", INDIAN COUNCIL OF AGRICULTURAL RESEARCH, NEW DELHI.

National Printing Works, Delhi (India)

Regd. No. D 571


CARRY MORE, GROW MORE,
EARN MORE
1
2
3
4
WITH
DUNLOP
EQUIPMENT
J B Dunlop
TRADE MARK
ADVX-11